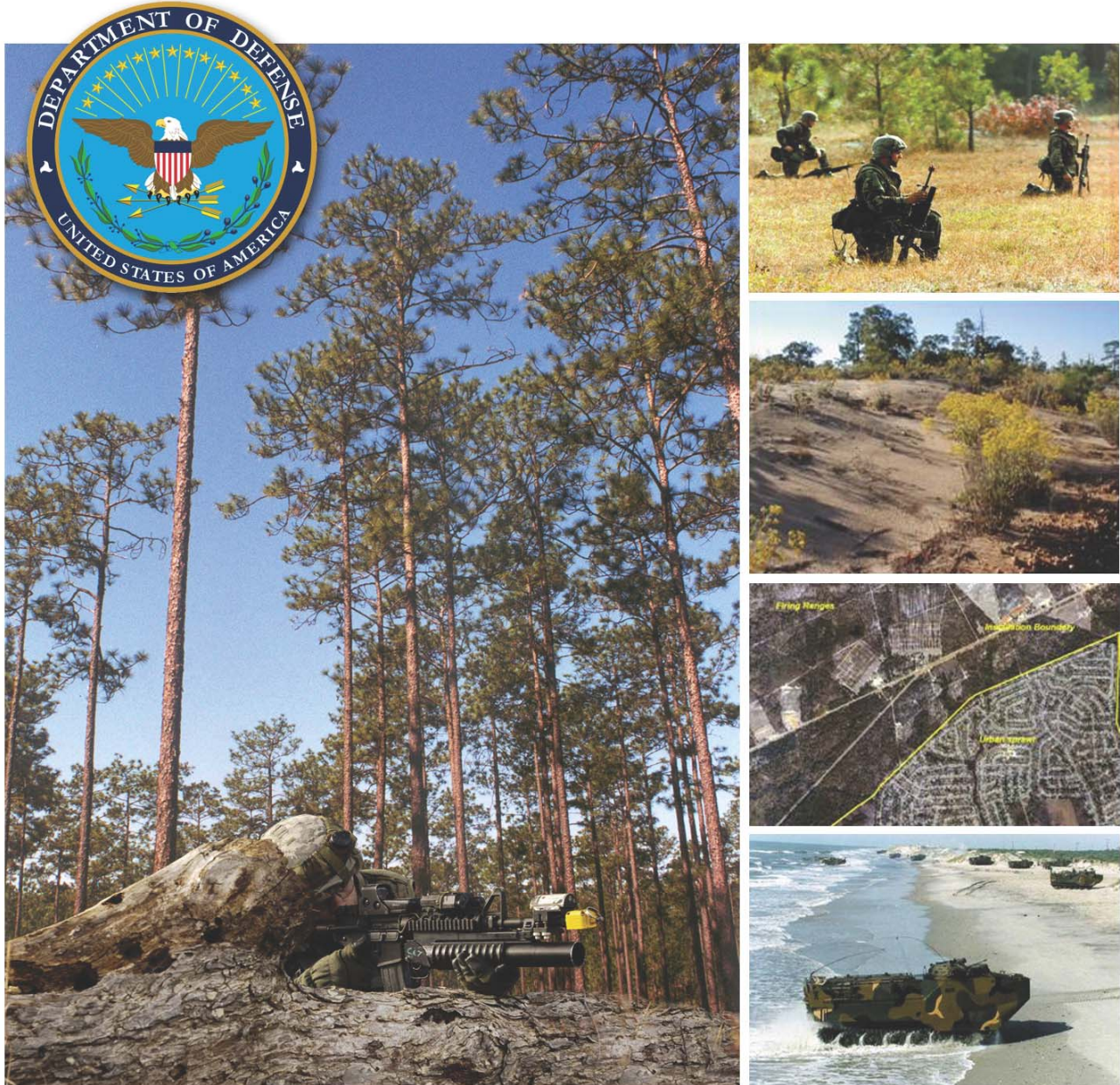


DoD Workshop on Southeast Regional Planning & Sustainability Report



**April 25-27, 2007
Marriott Atlanta Perimeter
Atlanta, GA**

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DoD Workshop on Southeast Regional Planning & Sustainability Report

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**April 25-27, 2007
Marriott Atlanta Perimeter
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FOREWARD

These proceedings encompass outcomes from the DoD Southeast Regional Planning & Sustainability Workshop, which took place in April 2007, and reflect the opinions and views of workshop participants, and not necessarily those of the Department of Defense (DoD). This document is available in PDF format at <http://www.serdp-estcp.org/workshops/serps>.

The workshop was co-sponsored by two parts of DoD's Office of the Secretary -- the Sustainable Ranges Initiative and the Strategic Environmental Research and Development Program/Environmental Security Technology Certification Program. This Report was produced in November 2007.

DoD acknowledges the contributions of each of the authors in preparing this document, with special thanks extended to Dr. Philip Berke for coordinating the input of all of the authors.

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EXECUTIVE SUMMARY

In April 2007, the Department of Defense (DoD) brought together academic researchers, stakeholders and other experts to discuss new trends and collaborative land use and sustainability approaches in the Southeastern United States. This Report reflects the principal conclusions and recommendations from this three-day workshop.

The workshop, which took place in Atlanta, Georgia, built upon DoD's increasing interest in working with outside partners to help ensure the sustainability of DoD lands and resources and encourage sustainable land use planning in communities and regions near military bases. The workshop's development was overseen by a diverse Steering Committee, several members of which also played active roles in the workshop and in compiling this Report.

The Southeast as a region provided a cutting-edge focus for the proceedings. As described in the Report's Introduction, the Southeast is currently undergoing tremendous population growth, which is placing extraordinary pressures on both the military and communities in the region. Sprawling land use and incompatible development were viewed by the workshop as an overriding challenge that impacts all areas of sustainability – economic, environmental, and social.

In order to identify shared issues of concern among the military and stakeholders as well as potential collaborative approaches to meet those concerns, the workshop was divided into five Breakout Groups – Military, Forests, Agriculture, Land Corridors, and Built Environment. The Report, following the Introduction, integrates the main recommendations from these Breakout Groups, and divides those recommendations into areas of policy, research, and outreach. It calls for increased DoD collaborative efforts with researchers and other stakeholders to meet the sustainability challenges of the Southeast, and identifies a number of promising areas offering opportunity for future progress. The Report then includes the Breakout Reports from each of the five Breakout Groups.

Overall, the Workshop participants believe this document provides a creative and helpful suggested roadmap as the military further pursues changes in sustainability policy, research, and outreach. From fostering a new generation of military sustainability professionals to creating “living laboratories” for universities to engage in cutting-edge conservation research, the proposed solutions offer myriad opportunities for shifting the current thought and behavior patterns of “business as usual” to more sustainable approaches.

SOUTHEAST REGIONAL PLANNING & SUSTAINABILITY WORKSHOP REPORT

INTRODUCTION

Philip Berke

The Southeast region of the U.S. is under intense population and land development pressures. The need for a stronger military presence and rapid population growth are placing major demands on the region's ability to sustain critical natural resources, provide healthy living environments, offer long-term prospects for economic vitality, and support the military's mission that requires space to train.

The Southeast is at a crossroads. Federal, state, and local governments and a wide array of stakeholders from the private and non-profit sectors must improve their ability to work together to anticipate and accommodate change within a sustainable regional development planning framework. Otherwise, the "business as usual" approach that has dominated much of the state and local growth management systems in the Southeast during the last half of the 20th century will simply react to change only after significant and often irreversible losses have occurred (Godschalk, 2007). Most of these systems are in need of an overhaul since they are not capable of meeting 21st century demands that require change in a more sustainable direction.

This report is a product of a three-day discussion among key stakeholders with an interest in the future growth and development of the Southeast. The discussion took place during the Southeast Regional Planning & Sustainability Workshop sponsored by the Department of Defense (DoD) in Atlanta, April 25-27, 2007. Stakeholders represented many interests groups from the public, private and non-profit sectors that are active in military base operations; land use planning; community development; conservation of farmlands, forests and natural areas; and real estate investment. Representatives from academia in the fields of agriculture, city and regional planning, forestry, and wildlife ecology also participated.

Goals of the workshop were:

- To identify the high-priority issues of shared concern between the military, academia, and other key stakeholders related to sustaining military training lands, regional planning, and compatible land use in the Southeast.
- To explore collaborative approaches – particularly ones that engage the academic and research community – that can build on existing efforts and help address these high-priority issues.

The workshop was designed to build upon DoD's Sustainable Ranges Initiative, including conservation buffer efforts, increased outreach with partners and surrounding communities, the

Southeast Regional Partnership for Planning & Sustainability (SERPPAS), and other related activities.

This introductory chapter provides an overview of the issues and ever-expanding demands for a more sustainable Southeast as identified by the workshop participants. The next chapter provides a synthesis of the policy, research, and outreach recommendations across the five domains discussed in the subsequent papers. The final set of chapters offers more detail on the major barriers to achieve sustainability and recommendations for policy and research in five core domains of land use and development in the Southeast: military installations, agriculture, forestry, built environments, and land corridors.

Major Issues Confronting a Sustainable Southeast

Intense Growth Pressures

Intense land development pressures are a fact of life in the Southeast. With a moderate climate, relatively low cost of living, diversifying economy, and easy access to beaches and mountains, the Southeast has become an increasing destination for employment, affordable housing, and retirement. Population growth rates between 2000 and 2005 reflect the growth pressures (Godschalk, 2007). Florida leads at 11.3%, followed by Georgia at 10.8%, North Carolina at 7.9%, South Carolina at 6.1% and Alabama at 2.5%. Most of this growth is concentrated in two areas:

- Major metro clusters, or MegaRegions, including the Piedmont Crescent extending from Birmingham to Atlanta, the Carolinas extending from Charlotte to Raleigh, and Florida metro areas of Tampa, Orlando, and Miami; and
- Coastal counties where second homes and retirement projects are being drawn to shoreline areas.

The impacts of rapid population growth in the Southeast are magnified by increased rates of acreage per person to accommodate new development. From 1982 to 2002, the acreage per person for new housing almost doubled, and since 1994 new housing lots greater than 10 acres accounted for 55% of the land development (Cohn, 2007). While development is critical to meet legitimate human needs, such as housing, transportation and jobs, this form of low-density land development (or sprawl) poses major barriers to creating sustainable communities. Sprawling development patterns increasingly place restrictions on the military's capability to expand bases and train (Friday, 2007), and have increased burdens on communities concerning air and water pollution, greenhouse gas emissions, energy consumption, loss of biodiversity, abandonment of older built areas, and inequities among different population groups defined by class and race (Berke, 2007).

Increased Presence of Military Bases

The role of the military will become more prevalent in the Southeast with the strategic realignment of military assets under the Base Realignment and Closure Act (BRAC) as well as other strategic and tactical actions. At the same time, the military is facing more challenges in achieving its mission. Urban expansion around military bases and training areas has

compromised base operations and military training. Concurrently, military doctrine and tactics have evolved to extended distances for training and have increased the physical impact footprint (noise, safety concerns, etc). The result is a growing competition for air, land, frequency, and water that is much greater than ever, and will become increasingly more complex in the rapidly urbanizing Southeast (Friday, 2007).

DoD is a major stakeholder in land management in the Southeast, with approximately 2.4 million acres, including national assets of exceptional ecological value and biological diversity. Of 400 major DoD installations world-wide, 79 are located in the Southeast (Friday, 2007). The military has a long played a key role in the evolution of the Southeast. A large number of military veterans are from “military-friendly” Southeastern states, which makes the growth of military assets in the Southeast, coupled with the significant investments in existing training ranges and infrastructure, even more likely (Friday, 2007).

The combined impacts of growth in population and military assets will seriously strain communities’ ability to provide adequate housing, schools, hospitals, recreational areas, fire protection, road networks, sewage treatment, water distribution, and general quality of life assets. It will also pose a serious challenge to maintaining compatible land and other resource uses near military bases in corridors or as otherwise needed for training (Elliott, 2007).

Yet, with growth comes other economic development opportunities; many communities near and around military installations will have opportunities to improve their tax base and expand public services, and invest in long-range planning for sustainability. At issue is how best to achieve mutually beneficial, sustainable economic development.

Loss of Forests and Farmlands

Loss of forests and farmland in the Southeast is occurring at historically high rates, especially on the fringe of expanding metro areas. Farmland loss was 51% greater in the 1990s than in the 1980s, with the annual loss between 1992 and 1997 at 1.2 million acres (Cohn, 2007). These losses are largely due to increasing population and home ownership, increased home lot size, increasing land values, and decreasing agricultural income, especially due to the loss of federal tobacco and peanut support programs (Brown, 2007). Agricultural income and lands are declining in the Southern states at the same time that land values and development pressures are increasing (Brown, 2007).

In the case of forestlands, the most immediate threat is the historically high land ownership turnover rate among private forestlands (both family and industrial forests) due to weakening markets for forest products (Wilkins, 2007). In the past, profitable and stable timber markets contributed to maintaining forest land use, but current weak markets have created uncertainty and a tendency to shift forestland to competing land uses. The large-scale sell-off makes forestlands vulnerable to fragmentation in the face of rapid urbanization and development.

While the threats to open landscapes are mounting, there is a parallel increase in demand for these lands. Southeast forestlands provide water, recreational resources, biodiversity, and other ecosystem services for a large proportion of the nation’s present population – and will be needed to support these services for a disproportionate amount of future population growth. Most

farmlands and forests are considered a compatible land use by the military and their maintenance is of particular concern. Buffers mitigate military impacts on nearby communities. Corridors provide training routes, special use airspace lanes, or connect one military base to another (Elliott, 2007). As these spaces are constrained by urban development and associated regulatory restrictions, it becomes increasingly more difficult to meet training requirements. In addition to buffer areas and corridors, efforts must be made to assess mutual benefit on lands further from bases that are still a part of military operating areas.

Uneven Capability of State and Local Growth Management Programs

Governments play a major role in either facilitating and encouraging, or guiding and managing growth depending on the view of the role of the public sector in development activities. Thus, outcomes of future growth activities depend significantly on the stance of legislatures that enact growth policies and state and local planning agencies that implement the policies.

States in the Southeast run the gamut from very progressive smart growth advocates to laissez faire market advocates. Godschalk observes that Florida is the leading state in the Southeast for requiring all of its local governments to prepare and adopt comprehensive growth management plans, followed by Georgia that adopted substantial reforms, North Carolina and South Carolina that pursued their first reforms, and Alabama with little or no reforms.

While proactive planning and policymaking are potentially effective long-term solutions, many existing local plans and programs in the areas where new development is most concentrated in the Southeast (urban fringe of metropolitan regions and coastal areas) are lagging and do not encourage more sustainable development (Berke, 2007). Weak plans and ordinances in these locations mean limited knowledge about existing human and natural resource systems, urban development impacts on these systems, and regional-scale land use and community design solutions to counter the impacts.

The uneven state and local capability to plan for and manage growth in the Southeast has vast implications for the military. It indicates an inability to deal with intense development pressure that generates incompatible land uses in buffers surrounding installations and corridors needed for training (Berke, 2007, Elliott, 2007). Most local, regional, and state organizations do not realize the breadth and scope of military training and operations that occur on its installations and ranges and within other military operating areas (Friday, 2007). An installation is often not considered as an integral part of the community or state given that its land, water, frequency and airspace are viewed as isolated inside a federal fence line.

Moreover, the military has been perceived as not being totally open about its needs – this further hampers state and local capability to plan for impacts of base expansions. It is not clear if the military has done the long-term planning it really needs, or if that planning has been done but has not been shared with the public (Friday, 2007). At issue is to bring the military and civilian groups together to share long term growth needs and develop mutually beneficial policies.

SUMMARY

In summary, the breakout session papers revealed that the growth management and planning problem in the Southeast is three-fold. First, the Southeast is experiencing unparalleled development pressures fuelled by population growth in metropolitan and coastal areas, and greater presence of military assets. Second, loss of working landscapes and critical natural areas in rapidly growing parts of the Southeast exacerbate existing environmental problems, add new ones, and degrade the military's ability to sustain lands compatible for training. Third, current plans, institutions, and analysis tools are inadequate to manage existing growth and development pressures. To meet these challenges, the regional planning and growth management system in the Southeast requires significant strengthening from top to bottom.

The nation needs a *sustainable Southeast* that is able to successfully adapt to twenty-first century challenges posed by growth, realignment of military assets, and loss of open spaces. States, counties, and cities need to grow their tax base through well managed economic development to cope with the emerging impacts of growth. Effective adaptation strategies require a far-reaching transformation in management plans, analytical tools, and institutions.

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SYNTHESIS OF BREAKOUT SESSION PAPERS: POLICY, RESEARCH, AND OUTREACH RECOMMENDATIONS

Philip Berke

Participants in the Breakout Groups recognized that a sustainable Southeast cannot be achieved without a coherent and supportive regional framework to guide growth and change. On such a landscape, human settlements are located and built through a planned process that supports military training, compatible land uses, healthy ecosystems, and livable communities.

To achieve this vision, three broad sets of recommendations – *policy, research, and outreach* – were derived from the Breakout Group chapters in Agriculture, Forests, Corridors, Military, and Built Environments. The following discussion synthesizes the main themes for each set of recommendations. Many of the recommendations are underway, at least in pilot form, within the Southeast Regional Partnership for Planning and Sustainability (SERPPAS), and those efforts need to continue to institutionalize the process and to better blend science and policy. In some cases, significant recommendations included in the breakout papers are not covered here because they do not fall under a particular theme. These recommendations can be found in the respective breakout session papers.

Policy Recommendations

The Breakout Groups recommended five key policies for strengthening proactive sustainable regional planning and management for Southeast-based military installations, and urban and natural environments.

1. *DoD should strengthen implementation of encroachment planning.* Encroachment equally impacts DoD installations and the surrounding communities, yet the public perceives that there is little guidance that identifies what DoD expects from the communities on how to deal with the problems. DoD needs to clarify what installations and ranges can share with the public as it relates to land use planning and future military operations.
2. *States should establish liaison offices.* Several states have established military liaison offices which have been very effective. These state-level liaison offices can aid the military in dealing with the myriad of regional and local resource use planning and regulatory issues that encroach upon the military's ability to perform its mission. Failure to do so may result in an installation's closure in future BRAC efforts. The military is a major economic force in most states and this loss can be traumatic for the local communities where an installation has closed.
3. *DoD should designate organizations to work with states.* DoD should have an organizational structure to interact with state authorities on encroachment planning issues that go beyond the limited charter of the Regional Environmental Coordinators. The organization would be charged with bringing military and state agencies together to share long-term growth needs and develop mutually

beneficial plans. This action would help alleviate concerns that the military is often not open about its intentions and actions.

4. *Create university-based sustainability institutes.* The institutes would bring together interdisciplinary groups of faculty, professionals, and students in the social sciences, natural sciences, urban planning, and environmental policy. DoD regional commanders, base operators, scientists and outreach staff also would be actively engaged. The institutes would conduct cutting-edge research on sustainable community design, and disseminate that knowledge through innovative teaching and outreach. Rather than serving as outside contractors, the staff of the institutes would offer an in-house capability to DoD, states, and communities to support active engagement – this would enhance the relevance of research, the responsiveness to particular needs, and ensure that research is used effectively.
5. *Strengthen partnerships among universities, NGOs and federal agencies for meeting high-priority research and technical assistance needs.* Solutions to issues of sustainability can be accomplished best when DoD managers engage directly with teams of scientists from multiple disciplines. For interagency planning and coordination, DoD has developed SERPPAS. It is recommended that DoD develop a parallel partnership for research and technical assistance. For the ecological and natural resource sciences, DoD could more effectively participate in the processes of scientific discovery, translational research, and demonstration by engaging with interdisciplinary groups of scientists through, for example, the Cooperative Ecosystems Studies Unit (CESU) network. The CESU network is designed to address the research and technical assistance needs of federal agencies through a collection of 17 regional units. The Southeastern states are represented in two adjacent CESUs – the Piedmont CESU and the Gulf Coast CESU. These units provide a venue for federal agencies to work directly with teams of scientists from multiple institutions and disciplines. An initial response to this recommendation might include working with a joint group of scientists from the Piedmont and Gulf Coast CESUs to develop a research agenda for addressing high-priority needs. [See the Report’s Conclusion and Appendix for an update on this effort.]

Research Recommendations

Participants of the Workshop recommended a research program be developed to support two core activities:

- Establish “living laboratories” as regional-scale test-beds, and
 - Support interdisciplinary research focus areas.
1. *Establish “Living Laboratories” as Test-beds for Regional Planning.* A high priority recommendation by workshop participants is for DoD to establish “living laboratories” for testing and developing novel approaches to planning for

sustainable regions, and conducting outreach and engagement activities. DoD needs to enhance its current multi-state initiatives because currently the military lacks many convincing examples of the value of conservation corridors and opportunities for promoting such corridors. Such laboratories can also serve as forums for testing the establishment of state organizations and regional partnerships that can better interface with the DoD. Participants recommended that additional resources be applied to these efforts to supplement the Services' programs.

As an example, DoD is exploring a more coordinated approach to planning along the longleaf pine ecosystem between Fort Benning, Fort Rucker, and Eglin Air Force Base to allow for proper land conservation planning. Identifying and successfully protecting other corridors for training and conservation, and determining how best to integrate them with sustainable economic development, will further enhance DoD's ability to promote regional partnerships. The Benning-Rucker-Eglin Corridor could serve as a living laboratory in which DoD can identify military bases and other military operation areas where compatible use (for training or connectivity between bases) could prove beneficial. The participants support the exploration to create "pilot living laboratories" in such corridors. Such efforts would afford significant opportunities to protect natural species, provide hazard mitigation, promote renewable energy resources, enhance water resources, recreation, and public health and enhance community economic opportunities. An assessment, followed by a collaborative effort to develop a joint vision for the identified region involving the various stakeholders and an effort to apply this vision to evaluate compatible use criteria, can help delineate boundaries and develop investment and implementation strategies. "Living laboratory tiger teams" should also be created to implement and provide ongoing advice and support to such projects that are underway.

2. *Support Three Research Focus Areas.* The research focus area is aimed at engaging in world-class applied research on the interaction between the built and natural environments, and how such interactions affect the sustainability of military installations and communities. Three major focus areas are recommended based on the research activities identified in the breakout session papers.

Research Focus Area 1: Planning for Sustainable Regions

This focus area involves research designed to build capability for planning and implementing a coherent and supportive regional framework to guide growth and change. Key projects include a regional-scale audit of local planning and growth management programs as a means to facilitate sustainability of military bases and surrounding regions, studies of institutional frameworks and their performance in supporting military missions and economic sustainability, and the design of decision-support tools to assess planned changes (civilian and military) on urban and environmental systems.

- *Conduct a Regional Sustainability Audit of Plans and Development Requirements.* The audit would serve as a local/regional government assessment tool to track how well plans and ordinances (e.g., land use regulations and incentives, infrastructure investments) counter conventional development (or sprawl) and advance more sustainable settlements. An assessment could identify potential gaps, and assess the strengths and weaknesses of how well plans and ordinances account for sustainability criteria. The tool could be applied to gauge progress in plans over time in integrating: (1) new research findings derived from the focus areas, and (2) improved research-based policy solutions. “Sustainability” audits could be published annually for military bases and surrounding regions to educate elected officials, base officials, and the public about issues and trends. For example, an audit could be useful for establishing baseline conditions for recent regional planning initiatives in the Sandhills and Coastal Plain of North Carolina and Eglin AFB-Apalachicola National Forest corridor in Florida.

Sustainability criteria used by the audit will be based on the emerging field of sustainability sciences (e.g., National Research Council publications, U.S. EPA Smart Growth reports) and best practices. Although every plan brings together a series of choices designed to fit a particular community, the criteria should be robust enough to determine the strength of any plan and its implementation ordinances in supporting sustainable settlement patterns. The intent is to help policymakers and stakeholders to think systematically about how facts, goals, and policies should be developed and integrated into regional planning programs.

- *Develop an Institutional Performance Assessment Model.* Metropolitan regions in the Southeast are emerging as dominant economic units in a globalizing society. The sprawling development patterns in these regions have considerable effects on forest and farmland preservation, watershed management, traffic congestion, and military training. The multiple networks of institutions that govern these regions make decisions that exert significant impacts on regional institutional performance. While some important scientific and technical work is being done to address these issues, much institutional change will be needed to tie this knowledge to advance regional plans and partnerships to resolve these issues.

The proposed research will develop an Institutional Performance Assessment Model (IPAM) to assess the influence of regional partnership building strategies (data sharing, visioning, formulating plans/policies, setting priorities for action, funding) and organization reform strategies (consolidation of municipal and county governments, potential privatization of infrastructure facilities and services) on the ability of metro governance institutions to support multi-state compatible use areas, sustainable urban settlements, and infrastructure services that are consistent with corridors and settlement patterns. The research will entail development of metrics to gauge the strength of institutional partnerships across regions and performance outcomes to be integrated into the performance assessment model. IPAM will help regional (and local) governing institutions to measure, compare, and improve institutional designs that most effectively build

regional-scale partnerships. Such a method could of particular value to SERPPAS.

- *Develop an Urban and Environmental Impact Assessment Model.* This project seeks to build on DoD's Sustainable Communities Toolbox (see <http://www.wg.srs.com/sustainablecommunitiestoolbox/>) and recent technological advances to improve decision support tools that will enhance the understanding of urban and environmental system performance and the impacts of planned change (civilian and military) on performance. Current land use-oriented tools are specialized for simulation and scenario construction (e.g., What-If?, INDEX, California Urban and Biodiversity Analysis), computer aided visualization (CommunityViz), and real-time mapping (Google Earth). Through a series of interviews and case studies with software developers and end users, researchers can systematically identify and evaluate these new and emerging tools, develop a comprehensive list of ideal functions, and compare these ideal functions in a gap analysis against what exists to refine the final product. Ultimately, this model could ideally be as easy for the layperson to use as the current Google Maps standard. It will allow anyone with access to the Internet to query a wide range of socioeconomic, forest, farmland, climate change, and land use and infrastructure datasets, model the distribution of future growth scenarios from civilian and military perspectives, and assess impacts of alternative scenarios based on a range of social, economic, and environmental sustainability indicators. The model will be tested in multiple communities.

Research Focus Area 2: Conservation Ecology

This focus area emphasizes improving the understanding of natural system dynamics, and exploring means of integrating ecosystem service values to develop markets for these services. Emphasis would be on quantifying eco-service values important to military bases, and individual landowners and communities. Research would also entail development of monitoring protocols for measuring ecosystem services from landscapes, and improve methods for assessing the cumulative effects of multiple disturbances on ecosystems.

- *Develop Metrics and Monitoring Protocols for Measuring Ecosystem Services.* Being able to maintain an accurate periodic accounting of important ecosystem services can serve as a more relevant tracking of some elements of ecosystem sustainability (e.g., watershed performance, endangered species habitat effectiveness, carbon sequestration, etc). DoD should lead science-based efforts to develop the "currency" for markets in ecosystem services. If real markets for environmental credits, habitat credits, and other crediting systems are to develop, then there must be a means for aggregating, brokering, banking and tracking uniform units. By ignoring eco-service values, the marketplace does not price the services – allowing, say, destruction of wetlands that masks environmental costs and increased investments in public facilities (e.g. wastewater treatment or flood mitigation) needed to recover the values. Without improvements in accounting tools, the conversion of forests to urban development is done more cheaply by not

accounting for the ultimate public cost through higher taxes and degradation of the military's ability to train.

- *Assess Cumulative Effects of Multiple Disturbances on Ecosystems.* Advances in GIS, remote sensing, analytical tools, and modeling provide conservation ecologists an opportunity to develop novel approaches for assessing the vulnerability of ecosystems to multiple disturbances. A promising area for advancement is in the development of spatially-explicit models that give scientists a framework for exploring landscape-scale questions such as: How are various combinations of large scale disturbances likely to influence ecosystem vulnerability to invasive species, pathogens, or pests? When combined with the effects of climate change, how are changing land uses, fragmentation, and land management constraints likely to influence ecosystem sustainability?

Research Focus Area 3: Human Behavior and Economic Sustainability

This focus area examines the impacts of public land use plans and policies on land market behavior, and gauges patterns of support and opposition for alternative land use options among stakeholders. Studies will seek solutions on how to create new and cost-efficient ways for landowners to capitalize on the various public values (e.g., values for ecosystem services and military training) of private lands to reduce the vulnerability of corridors, buffers, and other military operating areas, and support the economic vitality and livability of communities.

- *Evaluate Impacts of Growth Management Tools on Land Markets.* DoD needs to better understand land market forces, and how tools used by a government growth management program influence the behavior of market interests (households, businesses, developers, governments) in terms of the location, type, amount, intensity, density, and design of development. The tools that affect land use decisions include, for example, zoning regulations, land acquisition programs, taxes, fees, incentives, compensatory regulations (conservation banks, credit trading), infrastructure investments, and incentives (conservation easements, density bonuses). The aim is to seek options that are best for the military bases to use, the impact the use of each or multiple options might have on local land values and local property tax income, and how to minimize DoD costs. The pilot conservation credit program at Fort Hood is a successful example of providing benefits to both landowners and the military while keeping the costs to DoD relatively low.
- *Stakeholder Surveys.* DoD needs to better understand all of the interests and attitudes of potential stakeholders involved in encroachment issues. No one likes decisions being made about their land, their financial future, or their lives without a say. Studies need to be conducted wherever the military needs compatible land use or plans expansion or increased on-base activity without interviewing the surrounding landowners. Cultures differ based on personal experiences, age, race, locale and a number of other factors. Such interviews of local attitudes and interests in incentive programs need to be done locally and in person. The creation

of a pilot project in eastern North Carolina could potentially assess the potential for application of incentive programs with private landowners near multiple Marine Corps facilities. Similar research should also focus on the attitudes of the military towards openness with the civilian population.

- *Social Marketing Research.* This project would involve supporting a social marketing research initiative focused on changing attitudes and behaviors about the mutually beneficial links between military compatibility, conservation of open spaces, and compact urban development patterns. It would draw on knowledge and techniques developed in the social marketing field. This field has evolved from a one-dimensional reliance on public service announcements to a more sophisticated approach which draws on theories of communication and methods of survey research. Rather than dictating the way that information is to be conveyed from the top-down, researchers would be actively involved in guiding military and public agency professionals on how to listen to target audiences, and building the program from there. This focus on the “consumer” would involve in-depth research and constant re-evaluation of every aspect of the research program.
- *Assess Impacts of State and Federal Laws.* A study into how the DoD can benefit from future Farm Bill legislation and other federal acts (i.e., the Coastal Zone Management Act) would be useful. Once the military realizes the impact of such legislation on their activities, they would be more interested in providing input on the drafting of such legislation. In addition, Farm Bill and other types of legislation could include ways in which the DoD can add to the value and impact of that legislation on landowners.

Outreach and Engagement Recommendations

The outreach and engagement program focuses on training and capacity-building activities aimed at transferring knowledge generated through interdisciplinary focus area research into materials that are used to train practitioners, including, but not limited to local and regional planners, federal, state and local government officials and their staff, business owners, professional associations, elected officials, non-profit organizations, community groups and individuals. Following are recommendations of the types of projects that would be supported under this program.

1. *Establish sustainability planning teams to build capability.* The Marine Corps has a very successful program of community liaison offices at each installation. All installations should establish sustainable community teams, whose mission is to build capacity and community to plan at regional and local levels. A key of this initiative would be to cultivate local leaders to become sustainability advocates through workshops and information exchange. These teams are made up of skilled and experienced spatial data (GIS) analysts, urban and conservation planners, and facilitators. To assist in this task DoD should establish sustainability planning institutes at universities in the Southeast – see policy recommendations above.

2. *Build on and develop communication, public engagement, and leadership building strategies.* Improved sharing of information will enhance the military's ability to protect its missions – while supporting sustainable economic development. Most encroachment issues are externally driven and therefore, most solutions lie with the external encroachment source. Data, information, and knowledge must be shared with all through multiple means to include information sharing, cooperating, coordinating, and in many cases, collaborating. Tools are needed for planners and military base operators to communicate the value of resources protection plans for urban developments that advance sustainability and compatibility with military missions, and for scientists to communicate the knowledge that will enable operators, planners, elected officials, and local leaders in business and non-profits organizations (e.g., land conservancies, neighborhood associations) to carry out effective sustainable community and regional design initiatives.
3. *Publish best practice manuals.* DoD has begun to publish manuals describing best sustainable practices for built and natural environments describing successes, identifying best urban design, communication, and engagement principles, and recommending practical techniques. This practice should be expanded and aimed at state, regional, and local levels to help them reorient their practice to achieve sustainable communities in the context of sustaining military training lands. They should also address lessons learned to aid new commanders in taking over positions that involve significant levels of community involvement. Development of the manuals would be derived from examples from past and ongoing collaborative work by the military and communities, and innovative smart growth initiatives that compliment efforts to build the sustainability of military installations and human communities.
4. *University Course/Degree Development.* The USDA Cooperative State Research Education and Extension Service (CSREES) sponsors an Education Challenge Grant program to assist universities in developing new academic programs. DoD funds might be used to match these to develop needed distance education courses, continuing education certificates, or even degrees to address the many issues the Workshop participants have raised, such as in urban planning, agricultural policy, DoD planning, collaborative problem solving, and environmental regulations.
5. *Education and public outreach programs.* DoD needs to continue to emphasize establishment of internal and external training programs for conducting effective outreach and engagement activities as well as forums for engaging in real life encroachment problem solving until such time the training can be incorporated into Service schools and activities. Many of the land use planning, farmland and forest conservation, and encroachment management practices necessary are commonly misunderstood by the general public. Outreach and education programs developed in collaboration with non-governmental organizations (NGOs) and university extension programs can create a forum for increasing public acceptance.

AGRICULTURE

Robert D. Brown

EXECUTIVE SUMMARY

The pre-workshop background paper, “Southeast Agriculture: Trends and Issues,” by Gerry Cohn, provided the background for this discussion group. In short, agricultural income and lands are declining in the Southeastern states at the same time that land values and development pressures are increasing. Most agriculture is considered a compatible land use by the military, and vice versa. Thus the discussion group focused on the issues impacting the future of agricultural land use around military bases and solutions to some of those issues which could be addressed by further research, resource leveraging, and partnerships among universities, non-profits, and local, state and federal governments.

The military represents an aspect of the government, which has had a mixture of positive and negative relationships with the agricultural community. Often foremost in the minds of farmers and ranchers is the concern over their private property rights. Landowners do not like to be told what to do with their land, as that land, though perhaps declining in income, is increasing in value, and may be the key to that family’s financial aspirations. Agricultural land can be valued for its potential for housing and associated services development, productivity in providing food for the military bases and the nation, as aesthetically-pleasing green space, and/or for the ecosystem services it provides, such as that of a watershed, for carbon sequestration, or as wildlife habitat. Incorporating these values into the economic value of the land is a challenge, as are incorporating externalities, such as cultural attitudes about agriculture as a lifestyle, decisions made by the World Trade Organization (WTO), or attitudes of landowners and corporations about short-term versus long-term economics. There are already a multitude of incentives for agricultural land use through commodity price supports, conservation set asides, and even buyouts, but they may be inadequate to serve the military’s needs for buffers. To that end, the military has not always been open to the public with its long-term needs for training land and space to accommodate new weaponry or tactics.

Universities can address many of these issues through research, outreach efforts and academic programs. Databases are needed to inventory and catalogue existing incentive programs regionally and even locally and to develop a broker system so that one office makes such information available to both the military and the civilian landowners. Land transaction information, such as regional development plans and existing easements, if made accessible to the public, would provide fairness to land buyers and sellers. Research is needed to assess the impact of potential incentives on land values and local tax roles, to evaluate the attitudes of landowners about these options, to assess the attitudes of the military about being open with civilians, and to formalize military-civilian communications. Modeling research is needed to develop better land value assessment approaches for the military and to evaluate the potential economic, social and environmental impacts of their land use decisions. This would also help find gaps in the corporate knowledge and develop performance indicators. Studies into what the

military has to gain from Farm Bill policies could lead to a greater interest by the DoD in non-military legislation. Modeling of long-term DoD requirements in weapons and tactics development, and their concomitant training area needs could lead to an estimation of social, economic and environmental footprints on states and communities, to help eliminate conflicts and overlaps. An investigation into the statutory authority of the military to enforce existing water rights, easements and other land use agreements is warranted, as is research into how to eliminate cross-state barriers to land use planning. Finally, universities can develop distance education courses, certificates and degrees for military and community planning personnel in needed areas, such as urban planning, agricultural policies, collaborative problem solving, and environmental regulations.

INTRODUCTION

The breakout sessions were guided by the background paper, “Southeast Agriculture: Trends and Issues” (Cohn, 2007) of the American Farmland Trust. In that review, it was revealed that the Southeastern states are losing farmland at a rapid rate, largely due to increasing population and home ownership, increased home lot size, increasing land values, and decreasing agricultural income, especially due to the loss of federal tobacco and peanut support programs. Other issues of concern raised in this report include the division of inherited agricultural lands amongst African American families by heir property, which divides ownership shares evenly amongst all heirs, thus fragmenting the land; the aging of the farm population; and continuing environmental concerns of crop and livestock operations. Solutions to these problems, suggested in this chapter, include new enterprises such as agri-tourism and ethanol production, farm transition assistance, farmland protection and land trusts, state tax credits and deductions, and suggestions for new policy provisions in the 2007 Farm Bill.

Definitions and Assumptions

The group agreed on a definition of agriculture as the “Production of biological commodities and processes for which there is a market.” Upon reflection, however, the group also acknowledged that silviculture, commercial near-shore ocean fisheries, and even ecosystem services, such as water, carbon or endangered species credits could also be termed, “agriculture.” Thus some distinctions between land uses could be artificial, and the issues and solutions could well overlap with those of other discussion groups. Finally, the group agreed on the definition of an effective buffer as “A defined condition of use of land that cannot be changed without military concurrence.” The point here, for example, is that a zoning restriction might provide a temporary advantage to a military base, but since the restriction could be changed at any time by the local government, it would not really be a more permanent “buffer” to the military base.

The group reviewed the guidance given as metrics for analysis for this workshop. That is, the evaluation of the issues and solutions should be in the context of research, policy, local/regional coordination and information sharing; the issues of scale should include individual, local communities, state/federal, and inter-jurisdictional; and finally the testing of all solutions should be against the “triple bottom line (TBL)” of social, economic and environmental impacts. The group decided that this matrix was complex, as many problems tend to be, and could most appropriately be graphically represented as a 3-dimensional cube. Thus, in the deliberations, the

group agreed to refer to these guidelines, but not to attempt to “fill in the boxes” of the cube as they reviewed issues in a more general sense.

The group made the assumption that most agricultural land use is compatible with military interests. Exceptions might be instances where rangeland or forests might have to be burned periodically as a management tool, thus causing smoke to obscure aircraft runways. But even these potential conflicts could be overcome with proper planning and communication. Likewise, the group felt that most military operations were relatively benign to farming and livestock operations. Again, there might be anomalies, such as noise from a nearby military base disrupting poultry or dairy operations, or flight pattern restrictions impacting the use of aerial applicators for aerial chemical (pesticide and fertilizer) applications on farms and forests. Nonetheless, the overall concept to which the group agreed is that agricultural land use and military operations are largely compatible.

AGRICULTURAL ISSUES

Private Property Rights. The group first recognized the plethora of rights of private property owners. The passion of landowners and landowner groups for these rights vary by locale, but generally governments face criticism when they take land from unwilling landowners via eminent domain, regardless of the intended use, such as for highways, water reservoirs, or military bases, and regardless of the compensation offered the landowner. Likewise, many landowners have a general lack of trust in their county, state and federal governments, and even in other non-governmental organizations (NGOs), and as a result they distrust permanent easements. Landowners prefer to be able to make decisions about the use of their lands and their own financial futures. An example was given of Beaufort County, South Carolina, where it was said that the southern portion of the county has been fragmented by home development, with the previous largely Caucasian agricultural landowners reaping substantial financial benefits. Land trusts are apparently now recommending easements on the agricultural land in the northern portion of the county, which is largely owned by African Americans. The latter landowners point out that they too would like to be able to sell their land for development and reap enormous financial rewards for their families, as the Caucasians in the southern portion of the county have done. Thus it would seem that short-term financial incentives would be a more appropriate answer as a means of preserving agricultural lands as buffers for military installations with rapidly rising land prices.

Incentives. Agriculture is a highly complex industry in America, and there are a multitude of overlapping, if not occasionally conflicting, incentives for use of land for farming, forestry and raising livestock. Much of agriculture is driven by commodity markets, but even those are complex and conflicting. For instance, the potential of using corn for ethanol and soybeans for bio-diesel has led to tremendously increased production of these crops. But those crops require fertilizer, herbicides and other pesticides, as well as water. The conversion of these crops into fuels has already begun to impact the price of livestock feed, which could eventually impact food prices. There is concern too that the demand for more land to produce these crops could provide the incentive for farmers to take land out of the Conservation Reserve Program (CRP) and put marginal land back into production, with negative environmental results.

In addition to the impact of the markets themselves, agriculture has a multitude of commodity price supports from the federal government and special tax treatments from local governments. These change every five years or so when a new federal Farm Bill is approved. Likewise, local governments in rural areas survive with minimal property taxes, which could be reduced even further if agricultural land is put under easements held by governments or NGOs. Such easements reduce land value and thus tax losses to the county. The general consensus of the group was that: (1) it is difficult to define a “working agricultural landscape” in the sense of longevity or perpetuity, (2) although American Farmland Trust and Soil and Water Conservation Districts list most agricultural incentive programs, there is no “single source” directory of the many incentives that exist, including military and NGO incentives, and (3) it is difficult to judge whether existing incentives are effective in terms of buffering military bases.

Water Quality/Quantity. Most of the group felt the future of the nation’s development in nearly all aspects would rest on the issues of energy and water quality/quantity. Agricultural lands may offer watersheds, which are valuable to communities, the military bases, and the agricultural operations themselves. True, agriculture is often a major water consumer, and it can be a major source of non-point source pollution, which can have negative impacts on the very entities that are enhanced by water availability. Water regulations vary dramatically state by state in a complex milieu. Clearly, water is easy to regulate during periods of plenty, but challenging to regulate during periods of scarcity. Shortages of water will limit urban development, but also expansion, if not current use, of military bases, as well as types of agricultural land use. The group felt the need to consider water quantity, point-source, non-point source and total maximum daily loads (TMDL) of sediments in all water policies. Compatibility of water regulations across state boundaries would be useful as well.

Growth. Growth means development for housing and associated services, and can be defined in many ways, such as urban growth, suburban growth, or ex-urban growth. An example was given of a 40-acre farm near Raleigh, North Carolina, selling recently for over \$100,000 per acre. Agricultural landowners, whose children may not be interested in farming, consider their land to be their savings account for putting their children through college and/or for their own retirement. Thus land owners feel threatened by groups or suggested regulations that may inhibit them from profiting from their investment in their land. Studies in Texas have shown that there is literally no land in that very large state that does not have a greater current value for development than it does for agricultural use. This is a challenge for incentive programs, as land values continue to increase. Interestingly, land preserved from development by fee purchase or permanent easements may drive up the value of surrounding lands for development.

Politicians at all levels often are elected by promises of more jobs and economic prosperity. Agriculture seldom fits into that equation, and thus there are relatively few examples of proactive policies, political will, or leadership for the long-term good of society for protecting agricultural lands from development. An example was given, however, of an area of Colorado, wherein a ski resort added a tax to its lift tickets to provide a match to state funds to purchase the development rights of surrounding ranches. The ranches gained the money they would have made from selling their lands, while they were able to continue ranching; the ski resort was able to continue to attract skiers to a pristine area, unsullied by excessive development.

Food. It would seem obvious that a nation growing in population would need to protect its food supply. Nonetheless, much of America's food now comes from other countries, especially those crops which are labor intensive. It is also true that much agriculture in this country is produced on very small farms and ranches, most with agricultural incomes of less than \$10,000 per year. Thus, American agriculture is bimodal – with huge wheat/corn operations, dairies, and hog farms in some areas, and thousands of “hobby farms” in others. Agriculture then is often thought of as a tradition, or a lifestyle, rather than as a business. As such, agriculture has become a political commodity, controlled by subsidies and price supports. Military bases too use food, and although access to locally-grown foods may be valued, none of the participants were aware of a base that specifically bought locally-grown foods to serve on the base. It is commonly felt that the American public, as well as the military, are out of touch with American agriculture, with few understanding not only where their food comes from, but how local and national policies impact food availability, safety and prices. Moreover, in the group it was mentioned that the eventual outcome of the current round of WTO talks could impact farm subsidies, food production, and agricultural land values in this country. Those decisions could be years in coming, if ever, but the implications loom large.

Economics. The economics of land use are complex. As mentioned above, agricultural economics cannot be defined by market forces alone. Markets eventually provide balance, but do not take into account externalities. Externalities can include a family's values concerning their land, health costs or other potential changes in a family's need for income, international agreements, and even wars. Moreover, markets do not include the human element, such as the strength of the desire of landowners to stay in farming, or the needs of landowners to use their land as a financial savings instrument. New markets, such as for new products, agri-tourism, ethanol, or the creation of carbon, endangered species, or watershed credits, can add to the mix of economic decisions. Unfortunately, many corporate and even individual economic decisions are short-term. Long-term economic decisions, the kind that would be favorable to the use of agricultural lands as military buffers, require new thinking and new policies.

Systems Thinking. As mentioned during the discussion, the military and the public in general are out of touch with agriculture. Likewise, agricultural leadership is often out of touch with the military. Americans value privately-owned land, and the rights of landowners to decide what to do with their land. Those decisions, however, have huge impacts on systems around that land. Land is needed for housing, but also food production, aesthetics, watersheds, wildlife habitat, military buffers and other uses. Policies of the military impact surrounding lands, as do agricultural policies impact military bases. BRAC has closed many bases, in some cases disrupting local economies and in others offering opportunities to use that land for development (i.e., the Austin, TX airport). The military, however, still needs lands to train, and units from the closed bases are being moved to existing bases, thus causing the need for expansion and increased use of those bases.

Land Value. Nearly all land increases in value with time (the exceptions being land which becomes polluted, or less desirable for housing due to nearby factories, or land that floods, such as the New Orleans area). Examples have been given above as to the growing impact of the need for land for housing and associated services. Not all land is available (some is in parks or national forests), not all land is arable, and not all land is desirable for development. Thus, the

land that is left increases in value as more and more land is taken off the market by development, or by restrictions, such as easements. It is a truism that agricultural land, once converted to urban use, cannot be converted back to agriculture. That is, it is not “retrievable.”

The public has means of valuing land and increasing the financial returns from land, to include easements, new agricultural products and markets, tax and subsidy incentives, ecosystem services credits, and even development. Unfortunately, the military and the public seem to have no means of integrating these values, and especially integrating them in terms of value to military bases, and value to the human element – the desires and goals of the individual landowners.

Tax Programs. Land provides the tax base for the schools, fire and police departments, and a multitude of other services. The consideration of tax policies take into account fairness to the landowner – that is, what is the value and income to the land, and also the needs of the community – the payment for services rendered? Land is limited – we Americans are not making any more of it. Agricultural land is taxed a low rate as an incentive to provide for food production, and also because the costs of services in rural areas is low. But in fact, the land may now be of much higher value – possibly for new products, for easements, or for development, but taxes are not generally adjusted based on the potential of the land. Increased property taxes to account for the “real” value of the land could be an inducement for land owners to allow easements to protect their land in perpetuity, but such tax increases could also induce landowners to sell to developers. Simultaneously, the military needs to assess the value of the land to the non-landowning tax payers. Are they getting appropriate taxes from that land? Should they consider the value of that land as a watershed or as “green space” when assessing taxes to that land? The military and the public seem to be in need of a method of taking all of these issues into account when developing tax policies. Those tools are not presently available.

The Role of Universities. There is a saying that “society has problems, but universities have departments.” That is, due to their structure and their “publish or perish – preferably on federal grants” mentality, universities are often slow to make progress on solving society’s problems. Short-term, applied research is often not valued, outreach programs in many disciplines are often non-existent, and interdisciplinary research, especially across multi-university boundaries is difficult. Nonetheless, more and more interdisciplinary centers and institutes are being formed. Land grant universities have the traditional role of supporting the agricultural and natural resources communities through research, academic programs, and outreach or extension efforts. But few land grant universities have law schools or medical schools, and most public and private universities have programs addressing sociology, history, economics, and political science. All of these disciplines are needed in solving the complex problems faced today. The Agricultural Extension Service provides a unique access to the agricultural landowner, and that access could be made more available to all university endeavors, and to deliver the results of university problem solving.

Military Needs. Finally, in the discussion of issues, the group believes that the military has not been totally open about its requirements. It is not clear if the military has done the long-term planning it really needs, or if that planning has been done but has not been shared with the public. There is an often-perceived lack of openness with the public on the part of the military.

This may stem from the differing military and civilian cultures, concerns over real or perceived legal and national defense issues, and past public outcry over military land use decisions. There needs to be a way of bringing the military and civilian groups together to share long term growth needs together so that policies will be developed that are mutually beneficial.

The missions of the military services differ, and thus to the understanding they have divergent interests in buffers. The Army and the Marine Corps use their bases to train troops for offensive and defensive land-based missions. On some bases they train mostly infantry, paratroops, or special operations forces. This requires large areas of differing terrain, and may involve helicopters and other low flying aircraft. The impact of these exercises on the land within and outside of the military base may be light relative to other types of training. On other bases they maneuver tanks, mechanized infantry and artillery. This requires much more land, causes loud noise, and is highly damaging to the land base. The Navy, on the other hand, does most of its training at sea. Its bases house personnel and sometimes have landing fields to train pilots, but the major impact on their land and surrounding land is noise. The Air Force has less impact yet, as most, but not all, of their training bases are in remote areas, and their principle environmental issues is also noise.

Recurring Issue Themes. Once these issues were discussed by the discussion group, they defined six recurring themes: 1. Are the incentives for maintaining land in agricultural use meeting the military's needs for buffers and other land uses? 2. Is there an alignment among agricultural, conservation, and military land use policies? 3. Is compatible land use reflecting mutual benefits? 4. How can the military effectively cut across county, state, jurisdictional, institutional, service and agency boundaries? 5. How can the military enhance its interest in the non-military (i.e., agricultural, transportation, growth) policies and agricultural interests in non-ag policies (i.e., global warming, BRAC)? 6. How does the military change cultural attitudes to appreciate the triple bottom line – social, economic, environmental (i.e., what is the “highest and best use” of land)?

SOLUTIONS/RECOMMENDATIONS/OPTIONS

After outlining the major recurring themes, the discussion group devised potential solutions for each main issue, keeping in mind the triple bottom line. The focus of the discussion was the role of academics in promoting successful collaboration between the military and agriculture. They found that universities could provide intellectual expertise, research, technological resources, interdisciplinary dialogue, facilitation of inter-agency dialogue, and public outreach.

Policy

Research of DoD Interests in Non-Military Federal Legislation. A study into how the DoD can benefit from future Farm Bill legislation and other federal acts (i.e., the Coastal Zone Management Act) would be useful. Once the military realizes the impact of such legislation on their activities, they would be more interested in providing input on the drafting of such legislations. In addition, Farm Bill legislation could include ways in which the DoD can add to the value and impact of that legislation on landowners.

Local/Regional Coordination

Study of Interstate Constraints on Collaboration. Research needs to be conducted on existing barriers to interstate collaboration within the SERPPAS states so that interstate or multi-state compacts could be developed for such things as endangered species, conservation credits, and other issues. Such agreements already are in place for multi-state disaster responses, so that National Guard units from one state can be used in another state.

Information Sharing

1. *Inventory of Support Programs.* There are clearly a multitude of incentives for landowners to remain in agriculture. The group feels there is a need for an inventory of these programs across the USDA, the Department of Interior, DoD, the Department of Commerce, state and county programs, and of NGOs, such as the American Farmland Trust, The Nature Conservancy, and local land trusts. Such a database could then provide a menu for landowners, community planners, military planners, and others to access the potential of existing programs, especially if layered on top of each other, to provide incentives for landowners.
2. *Development of Open-Access Databases.* A need exists for localized databases, which include information on community growth plans, military expansion plans, policy considerations, local easements and restrictions, ecosystem service agreements, and estimation of land values from all perspectives available in order to have fair land transactions. Land speculation is a vibrant industry in this country. Although traditional agricultural income is declining, opportunities for new income from ecosystem services, land development, and other uses are increasing, as is the potential for chicanery. The solution to this dilemma is for all people to have total access to all information available.
3. *Development of Institutionalized Communications.* Although some bases have specifically identified community relations personnel, not all do, and few have personnel versed in relations peculiar to rural or agricultural landowners. States have Civilian Aides to the Secretary of the Army. State-level and base-level liaison personnel are needed to attend to the issues of land use around the bases.
4. *Development of a Broker System.* Once these incentives are recognized and catalogued, the military needs an economic study to develop a “broker system” or “1-stop-shopping” system to match the incentives available to the eligibility of the landowners. The Farm Services Agency (FSA) now provides that service, but only for USDA agricultural policies.
5. *University Course/Degree Development.* The USDA Cooperative State Research Education and Extension Service (CSREES) has an Education Challenge Grant program to assist universities in developing new academic programs. DoD funds might be used to match these to develop needed distance education courses, continuing education certificates, or even degrees to address the many issues the

group has raised, such as in urban planning, agricultural policy, DoD planning, collaborative problem solving, and environmental regulations.

ACTION OPPORTUNITIES

Research

1. *Research Into DoD Options.* As research is conducted on options and incentives for landowners, concurrent research needs to be done on which options are available and are best for the military bases to use, what impact the use of each or multiple options might have on local land values and local tax income, and how to minimize DoD costs. The military must remember that agricultural land use issues are complex, and that one policy or incentive may have both positive and negative impacts on others, as well as on the culture of the surrounding populace. Maximizing the impact of DoD expenditures in this arena is also imperative. The pilot conservation credit program at Fort Hood was given as an example of providing benefits to both landowners and the military while keeping the costs to DoD relatively low. Similarly, the military is in fact a landowner, and often existing agreements over water rights or easements are often lost or forgotten. Knowledge of and the ability to enforce such options should be included in this mix.
2. *Landowner Surveys.* No one likes decisions being made about their land, their financial future, or their lives without a say. Studies need to be conducted wherever the military needs buffers or plans expansion or increased on-base activity without interviewing the surrounding landowners. Cultures differ based on personal experiences, age, race, locale and a number of other factors. Such interviews of local attitudes and interests in incentive programs need to be done locally and they need to be done in person.
3. *Modeling TBL.* The “total bottom line” (TBL) of social, economic and environmental impact of policies needs to be modeled first to educate stakeholders to find gaps in the knowledge, to test the “ripple effects” of one policy on another, and to define performance indicators to test when policies are successful. Such modeling is not easy or simple but is necessary to insure lawmakers [?] are not making economic policies at the expense of social values or environmental concerns, nor allowing one of the latter considerations to dominate others.
4. *WTO Impact Modeling.* The Doha round of WTO talks could change U.S. agricultural policy dramatically and could thus have an impact on the military. A study of the potential impact of such changes would be of value.
5. *Long-Term DoD Development Research.* Over time, new weapons emerge and new strategies are developed. Rarely are training requirements developed at the same time. Research needs to be done on the 10 to 50 year plans for new

weaponry and tactics and the concomitant training area needs. Those needs must be assessed through the complete life cycles of those weapons and tactics (including BRAC) to estimate their impact on TBL within states. Conflicts and overlaps could then be determined and solutions could be developed.

6. *Study of Military Attitudes.* Research needs to be done on the attitudes of the military towards openness with the civilian population. This could be attended by case studies of successes and failures of military-civilian transactions over land use issues, and “how-to” manuals could be developed.

Demonstration/Validation

Development of Alternative Military Appraisal Methods. Research should be done as to how the military evaluates and appraises land. For instance, if a new firing range is developed on a base at a cost of \$25 million and becomes restricted in its use because of off-base surrounding land assessed at \$10 million, what is the real value of that off-base land to the military? Currently, DoD would be limited to paying 125% of the assessed value of that land, yet a \$25 million investment on base could be at stake. The statutory authority of the military needs to be investigated to determine if policy changes are needed within DoD.

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FORESTS

Neal Wilkins

EXECUTIVE SUMMARY

In the Southeast forest sustainability is increasingly important for maintaining prosperity in the region. Sustaining the eco-values, functions, and benefits of the forestlands is also a key to sustaining the training capacity and resources for military installations. At 214 million acres, forestlands in the South account for the largest single land use. With over 86% of the region's forestlands in private ownership, the prospects for sustainability lie in the management and ownership decisions of individual landowners, foresters, investors, and land managers. The region is facing some large-scale shifts in land ownership demographics, weakening timber markets, and strong resource pressures from an increasing population. For many landowners, the economic incentives for maintaining large, intact, productive forestlands are weakening. As a consequence, forest sustainability is threatened by urbanization and development. While these and other threats to sustainability are mounting, the demand for ecosystem services provided by forestlands is also growing.

In this report, The Breakout Group summarizes several issues and recommendations for maintaining forest sustainability in the South – specifically focusing on the positions that DoD could take while engaging with scientists from universities and other research institutions. An overriding issue identified is the threat to sustainability due to land use conversion and loss of forestlands. The need is recognized to focus on forest ecosystem services and developing markets for those services as a means for counteracting some of the primary threats. The Group acknowledged the need to better understand the cumulative effects of multiple disturbances on forestlands. Finally, they recognized that the demands on water quality and availability are likely to have an overriding influence on forests, forest management, and the sustainability of forests in the Southeast.

The recommendations include: (1) Strengthen partnerships among DoD and universities, NGOs and federal agencies for meeting high-priority research and technical assistance needs; (2) Support delivery of education and public outreach programs; (3) Establish a program for developing new incentive structures and other policy innovations for the conservation and stewardship of private forestlands; (4) Move proposed and existing habitat crediting programs forward for demonstration; (5) Develop assessment standards, metrics, and monitoring protocols for measuring ecosystem services related to forestlands; (6) Improve methods for assessing the cumulative effects of multiple disturbances on forest ecosystems; and (7) Develop tools for projecting watershed performance and regional water availability under scenarios of biomass-for-energy demand, shifting timber markets, population growth, and climate change.

INTRODUCTION

Defining sustainability has been compared to defining “justice” or “democracy” – the definitions are elusive, but the concept is nevertheless important (Floyd 2002). One common definition for “sustainable forestry” (from the Dictionary of Forestry) is the “*practice of meeting the forest resource needs and values of the present without compromising the similar capability of future generations.*” With the forestlands of the Southeast facing several threats, it might be said that the sustainability of the forest resource is being challenged. This report summarizes some issues regarding forest sustainability in the Southeast that emerged from the Forest Breakout Group – also included are the recommendations for DoD engagement with university scientists on the topic. It should be noted that there are no official statistics for the “Southeastern forestlands.” Therefore much of the information for the region of interest had to be taken from those statistics for the Southern forests which include states from Texas to North Carolina, principally the longleaf and loblolly pine forests.

Of the estimated 620 million acres of forestland in the US, over 34% are in the 13 Southern states (Smith et al 2004). More than 60% of the nation’s timber harvests draw from these Southern forestlands (Wear 2007). As a subset of the Southern forestlands, the Southeast’s forestlands provide water, recreational resources, and other ecosystem services for a large proportion of the nation’s present population – and will be needed to support these services for a disproportionate amount of future population growth. In addition, Southeastern forestlands support important wildlife resources and biological diversity.

In the South, forestlands account for 214 million acres, over 86% of which is in private ownership (189 million acres). Of the South’s forestland area, over 127 million acres are classified as “family forests” (Butler and Leatherberry 2004)¹. These family forests account for some 4.3 million ownerships, over 43% of which are titled to individuals over age 65 – so most of these lands will transfer ownership over the next 2-3 decades. According to data summarized by Butler and Leatherberry (2004), the top 4 concerns of family forest owners in the South are (1) disease and insects, (2) fire, (3) family legacy, and (4) taxes. These are sustainability concerns – representing the risks to the resource, and uncertainty of maintaining ownership. Two of these top concerns (“family legacy” and “taxes”) demonstrate that family forest landowners are troubled by the consequences of their forestlands changing hands.

Integrated timber companies have traditionally managed large areas of forestlands to help supply their mills in the region. As of 2002, there were about 36 million acres of industrial timberlands in the region (Smith 2004). During the last 10 years however, the forest industry has been divesting of its lands in the South – during this period, more than 18 million acres of industrial forestlands have changed hands (Clutter et al. 2007). Nearly all integrated forest products companies in the region have sold forest land holdings to real estate investment trusts (REITs) or timberland investment organizations (TIMOs) (Wear 2007). The factors contributing to these transactions include accumulated debts from corporate mergers, undervalued timberlands reflected in stock prices, tax policies, and increased confidence in the long-term timber supply to

¹ In the past, these forests were alternatively referred to as non-industrial private forestlands (NIPF) – but given some recent shifts in forestland ownership, the distinction between industrial and non-industrial is not as clear as it once was.

the wood products industry² (Wear 2007). As forestlands are constantly reappraised under these new ownership structures, many holdings are likely to be sold in smaller parcels and eventually developed.

With private forestlands (both family and industrial forests) changing hands at such historically high rates, forests are increasingly vulnerable to fragmentation, urbanization, and development (Wear 2007). According to Wear and Greis (2002), this trend is the most immediate threat to forest sustainability in the Southeast.

The members of the Forest Breakout Group recognized that the fragmentation and loss of forestlands, when combined with other trends can create an uncertain future for a range of public values. In the context of military lands, these trends present continued challenges for maintaining compatible land use adjacent to training installations. The forests on military installations are not islands – they influence, and are influenced by, the land use outside the fence. Inasmuch as military lands both contribute to and benefit from a sustainable forest landscape in the region, it appears that sustaining the forestlands of the Southeast is in the best interests of sustaining the nation's military.

ISSUES

The Forest Breakout Group identified a number of major issues influencing the sustainability of forest ecosystems in the Southeast. Taken as a whole, the challenges to sustainability of forests in the region are considerable. The Breakout's approach was to identify key social, economic, and ecological factors likely to pose the greatest overall risks to sustaining the region's forestlands. From the outset, the group made the assumption that there was a strong military interest in maintaining forestlands as a principle and primary land use throughout much of the region. This interest acknowledges the clear public benefit of private forestlands; implicit in this process is that any military engagement with private lands would include contributing to innovative solutions for issues of maintaining sustainable forestlands – including working forests.

1. *Land Use Conversion and Loss of Forestlands.* Throughout much of the preceding century, forest and woodlands were considered a residual land use. In other words, forestlands were largely assumed to be unsuitable for any other purpose. For landowners, the opportunity costs of alternative land uses were given little attention. As forest products markets have weakened, the demand for land consumption for suburban development, exurban development, and other land uses has increased. The effect is ownership fragmentation, rapid conversion, and loss of forestlands throughout much of the region. While some level of land use conversion is likely inevitable, the overall strategy of a regional approach to forest sustainability simply must include an objective for making forestlands more economically favorable when compared to a competing land use. Alternatives include measures for reducing the marketable value of forestland through conservation easements, transferable development rights, or purchase of

² An alternative way to look at confidence in the timber supply is that the market outlook for selling forest products has weakened.

development rights programs. Other approaches include modifications of the federal estate tax, regulations such as rural zoning, and outright public purchase of forestlands. To influence land use trends on the scale needed to sustain forest land use across large areas, these approaches require more financial, political, and social capital than is generally available. Thus the participants in this Breakout Group identified a need to develop more innovative landowner incentives for maintaining forestlands across a region dominated by private ownerships. Such an approach might include the development of markets for the ecosystem services resulting from well-managed forestlands.

2. *A focus on forest ecosystem services.* Under many of the projections considered for the region, the increased population and development pressures, combined with shifting forest ownership structures, weakened timber markets, and insufficient incentives, are likely to result in a decrease in forestlands along with a loss of natural forest functions. The increased population, however, will increase demand for many of the services that forest ecosystems provide. The demands will likely increase for water, recreation, wildlife habitats, air quality, nutrient cycling, carbon storage, aesthetics, and other important services. This is not to discount the importance of traditional commercial forest products, but to emphasize that sustaining these ecosystem services are an increasingly important focus. The challenges of assessing, monitoring, and valuing these ecosystem services are emerging as important issues.
3. *Markets for forest ecosystem services are poorly developed.* In the past, profitable and stable timber markets have contributed to maintaining forest land use throughout much of the Southeast. Weak timber markets yield uncertainty and a tendency to shift forestland to competing land uses. Creating landowner benefits for a wider range of public values (i.e., ecosystem services) would increase the likelihood that forestlands could compete favorably with alternative land uses. If DoD and other partners can help create markets and other mechanisms whereby landowners can be fairly compensated for investments in maintaining important ecosystem services, then private landowners will be more likely to implement measures to maintain forestlands and their conservation values. These markets are not yet developed – and the challenges for such development are not trivial. Such market development will require a spirit of risk-taking, entrepreneurship, and a willingness to consider novel approaches. The efforts required to combine the biological and physical sciences, economics, sociology, and business management approaches in order to develop such markets could be supported by DoD.
4. *Demands on water quality and availability are likely to have an overriding influence on forests, forest management, and the sustainability of forests in the Southeast, and vice versa.* Forested watersheds are a primary source of freshwater in the region. Given projected population increases, concerns over water quality and availability will continue to grow. The projections for future water availability in parts of the region vary under different scenarios of

population growth, urban expansion and changes in land use. Adding to the uncertainty are scenarios that include climate change, recurring drought, and changes in land use. Scenarios that include changes in agricultural programs and policies to promote biomass-for-energy from forestlands may also have an impact on regional water availability. The tools for projecting the consequences of these and other scenarios are not yet well developed.

5. *Cumulative effects of multiple disturbances to forestlands are not well understood.* Cumulative effects are the incremental impacts on the environment that result from past and present disturbances. When combined with site-specific conditions, the cumulative effects of multiple disturbances (including the influence of management) can cause forestlands to be more or less vulnerable to future disturbance. Experiences from the aftermath of Hurricanes Katrina and Rita have demonstrated that the vulnerability of forest ecosystems to extreme disturbance is a function of site factors, prior disturbance, and management history (Stanturf et al. 2007). One of the high-priority needs is a more refined understanding of the cumulative effects of multiple disturbances on forest ecosystems. The cumulative impacts from invasive species, storms, fire, land use history, fragmentation, and climate change are not well investigated. For example, the scientific base for predicting the vulnerability of forests to degradation due to pests, disease, or invasive species given the cumulative effects of fire exclusion and climate change is poorly developed. With a more complete understanding of cumulative effects, foresters and other land managers can make better decisions for silvicultural treatments, harvest scheduling, and other management actions for reducing long-term risk.

RECOMMENDATIONS

Most of the major impediments to sustainability of forest ecosystems in the Southeast are regional in scope and multidisciplinary in nature; therefore, DoD will have to employ multidisciplinary-based efforts to find proper solutions. The most effective and durable solutions will likely result from collaboratively working with scientists, policy-makers and managers, both within and outside DoD. Members of the Forest Breakout Group acknowledged that such collaboration does not normally occur without some guidance. Thus, an effective approach for the military will require that they engage scientists in a manner that compels DoD to collaborate with managers and policy-makers.

Partnerships & Outreach

1. *Strengthen DoD's partnerships with universities, NGOs and federal agencies for meeting high-priority research and technical assistance needs – engage the Cooperative Ecosystems Studies Units (CESUs).* Solutions to issues of forest sustainability can be accomplished best when DoD managers engage directly with teams of scientists from multiple disciplines. A strong example of such interagency planning and coordination is SERPPAS, a regional-level partnership that engages state governments, DoD, and other federal agencies in linking policy

projects and issues with science-based tools. The Group recommends DoD develop a parallel partnership for research and technical assistance. For the ecological and natural resource sciences, DoD could more effectively participate in the processes of scientific discovery, translational research, and demonstration by engaging with interdisciplinary groups of scientists through the CESU network. The CESU network is designed to address the research and technical assistance needs of federal agencies through a collection of 17 regional units. The Southeastern states are represented in two adjacent CESUs – the Piedmont CESU and the Gulf Coast CESU. Both have active membership from a full range of university-based research institutions. These units provide a venue for federal agencies to work directly with teams of scientists from multiple educational institutions and multiple disciplines. As the CESU network was established by Congress, member federal agencies can collaborate directly with university scientists to develop and implement work plans for research and technical assistance. Such collaboration provides an advantage when addressing complex ecological and natural resources issues. An initial response to this recommendation might include working with a joint group of scientists from the Piedmont and Gulf Coast CESUs to develop a research agenda for addressing the high-priority needs expressed below.

2. *Support education and public outreach programs.* Many of the silvicultural practices necessary for maintaining healthy forest ecosystems are commonly misunderstood by the general public. Outreach and education programs developed in collaboration with NGOs and university extension programs can create a forum for increasing public acceptance. Important management practices such as prescribed fire could particularly benefit from well-developed outreach programs. Likewise, the concept of ecosystem services as a public good from forestlands may require a well-designed public outreach campaign.

Policy Innovations

The Forest Breakout Group recommended several approaches for engaging in actions that could result in advancements in policy.

1. *Establish a program for developing new incentive structures and other policy innovations for the conservation and stewardship of private forestlands.* Within the region, DoD should establish a program for developing and testing of a variety of incentives for maintaining forestland conservation and management. An overall aim of such an effort would be to create new and cost-efficient ways for landowners to capitalize on the various public values of private forestlands. By focusing resources on the development, testing and implementation of innovative solutions for strategically discouraging conversion of forestlands to other land uses, this program could yield analyses valuable for reducing the overall loss of forestlands in areas of conservation interest – e.g., where compatible land use with the military is a priority. This program should also aim to develop effective

incentive structures for modifying silvicultural practices and rotation lengths when and where they would likely benefit species and ecosystems of concern.

2. *Move proposed and existing habitat crediting programs forward for demonstration.* DoD should move proposed and existing habitat crediting programs into a demonstration phase – particularly for species and habitats that are of important conservation interests to military installations. The USFWS recently established a partnership agreement with USDA Natural Resources Conservation Service (NRCS) and the Association of Fish & Wildlife Agencies (AFWA) to promote the effective use of habitat credit trading for Endangered Species Act (ESA) listed or other at-risk species. Through this agreement, these agencies acknowledged that translating conservation action into tradable habitat credits may achieve environmental benefits more effectively than traditional regulatory or voluntary approaches. While these programs are not yet well-developed, substantial progress might be made through implementing habitat crediting programs on an installation by installation basis.

Research

The Forest Breakout Group recommended the development of some broad research programs for sustaining productive and biologically diverse forestlands in the Southeast.

1. *Develop assessment standards, metrics, and monitoring protocols for measuring ecosystem services from forestlands.* Given that maintaining regulatory compliance on military installations is a high priority issue, DoD should be at the forefront in the development of alternative approaches for compliance. In addition, being able to maintain an accurate periodic accounting of important ecosystem services can serve as an important tracking of some elements of forest sustainability (e.g., watershed performance, endangered species habitat effectiveness, carbon sequestration, etc.). At the federal level, DoD should lead science-based efforts to develop the “currency” for markets in ecosystem services. If real markets for environmental credits, habitat credits, and other crediting systems are to develop, then there must be a means for aggregating, brokering, banking and tracking uniform units. Means for reliably assessing the provision of several marketable ecosystem services could be developed for application through crediting systems. Metrics and assessment standards must be accompanied by appropriate monitoring protocols for both implementation and effectiveness.
2. *Improve methods for assessing the cumulative effects of multiple disturbances on forest ecosystems.* Advances in GIS, remote sensing, analytical tools, and systems modeling provide forest ecologists an opportunity to develop novel approaches for assessing the vulnerability of forests to multiple disturbances. Such systems provide a context for considering retrospective studies (i.e., natural experiments) of the eventual impacts of multiple disturbances. A promising area for advancement is in the development of spatially-explicit models that give

scientists a framework for exploring landscape-scale and regional questions such as:

- How are various combinations of large scale disturbances likely to influence forest vulnerability to invasive species, pathogens, or pests?
 - How altered fire regimes are likely to interact with other disturbances – and what are the impacts on forest ecosystems?
 - When combined with the effects of climate change, how are changing land uses, fragmentation, and land management constraints likely to influence forest sustainability?
3. *Develop tools for projecting watershed performance and regional water availability under scenarios of biomass-for-energy demand, shifting timber markets, population growth, and climate change.* Advances in computing, remote sensing, and eco-hydrology modeling present opportunities to build advanced simulation models for projecting watershed performance and water availability. These models could be linked with other available models for scenario analyses of changes in water resources in the face of population growth, climate change, and shifting timber markets and the consequences of adopting alternative approaches for biomass-for-energy programs. The Forest Breakout Group also discussed the use of mediated modeling processes where stakeholders are used to assist in developing some of the modeling parameters.

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LAND CORRIDORS

Michael Elliott

EXECUTIVE SUMMARY

As DoD and the various branches of the military realign their military bases, base commanders face new challenges. Management of land corridors outside of military bases are of particular concern because such corridors provide training routes, special use airspace lanes, or connect one military base to another. Land corridors take three major forms: conservation, infrastructure, and development. Conservation corridors include contiguous land for protecting habitat and species or for outdoor recreational uses. Infrastructure corridors include linear land for utilities, energy distribution, railways, and roadways. Development corridors are linear land developments that array themselves along infrastructure corridors, especially roadways, such as strip shopping centers. Conservation or infrastructure land corridors are often compatible with military use, while developed land corridors are usually incompatible. Of the three, conservation corridors are likely to be the most beneficial to the military, because they prevent the military bases from becoming islands of biodiversity, and because, unlike infrastructure corridors, they do not promote residential or commercial growth.

In addition to protecting corridors for military training and connectivity purposes, conservation corridors are important to military bases for several reasons. First, military bases often provide large tracts of viable wildlife habitat surrounded by landscapes fragmented by development. More regionally viable efforts to conserve larger landscapes would allow threatened and endangered species to populate areas outside of the military bases where they now concentrate. Second, conservation corridors provide “green infrastructure” that enhance ecosystem services such as water supply and other related benefits to human communities. Third, current public policy tools have been insufficient to prevent significant fragmentation. Fourth, conservation corridor efforts are inherently interjurisdictional, and require the cooperation of multiple jurisdictions, interest groups, and military bases. A common planning framework is needed, one that is developed collaboratively. And fifth, the military can contribute significantly to both the sustainability of their own bases and to the ecological, social, and economic sustainability of the communities in which they reside by more fully engaging the process of conservation corridor planning and implementation.

The Land Corridors Working Group identified five major issues associated with the identification and protection of land corridors. These include: (1) the mismatch between the spatial scale of the problems and the institutions available for communities and installations to resolve those problems; (2) decision tools that marginalize the environment; (3) lack of incentives to promote sustainability goals; (4) stove pipe thinking; and (5) the lack of capacity in both the military and the community to engage in meaningful collaboration.

The Land Corridors Working Group considered alternative ideas for promoting more effective conservation of militarily important corridors. The Working Group recommended as a primary option that an installation or set of military installations identify a specific opportunity for

corridor conservation, one where protection of the corridor(s) would promote both military and community sustainability. The assessment would be followed by a collaborative effort to develop a joint vision for this corridor, involving the various stakeholders and an effort to apply this vision to evaluate corridor criteria, delineate corridor boundaries, and develop investment and implementation strategies. This “Corridor of Dreams” is the highest priority because currently the military lacks convincing examples of the value of conservation corridors and opportunities for promoting such corridors. Creating such examples, and by doing so testing the concept, is an important first step.

Additional options that could be used either in conjunction with a “Corridor of Dreams” pilot project, or as stand-alone efforts to improve the military and the public’s capacity to identify, assess, delineate, and implement such corridors, are as follows:

1. Promote greater coordination with local and regional partners, especially involving academic communities and including strategic alliances. These would assist in identifying and establishing corridors and capacity building within the military, local, state, and federal jurisdictions. The improved coordination would foster improved efforts to link academic education programs to resolving military needs in the environmental and community development arenas.
2. Improve policy and planning processes associated with corridor planning and implementation. These processes would be improved particularly by increasing the resource base available for conservation efforts, creating incentives for landowners and base commanders to initiate and participate in conservation efforts, more proactively identifying encroachment threats, and supporting research that increases the capacity to identify and conserve corridors.
3. Engage the academic institutions in action research that helps military commanders deal with pressing problems, while also supporting basic science. This interaction would help define and specify buffer and corridor needs, promote best practices for building community collaboratives, evaluate ecosystem services and clarify their importance to both the military and communities, test innovative ideas through demonstration projects, develop better approaches to evaluating land corridor projects than provided by cost benefit analysis, and improve the capacity of decision makers to visualize the complex interactions found in conservation corridors.
4. Craft tools to promote more effective information sharing through workshops, develop guidebooks and toolboxes to assist governments to assess and implement sustainable land use initiatives, and promote education.

INTRODUCTION

Objectives (Overall)

As DoD and the various branches of the military realign their military bases, base commanders face new challenges. Two concerns of particular interest to the Land Corridor Working Group include threats to the capacity of military bases to engage in training consistent with the demands of modern combat, and threats to the effective working relationship between the military and the host communities that surround their bases. This working group therefore sought to identify high priority issues associated with sustaining military training land and air space, as well as the regional planning tools needed to promote compatible land use on lands outside the base.

The Working Group focused on land corridors, namely linear corridors created by currently undeveloped lands or by linear infrastructure such as roadways or utilities, which are of potential use to military bases in the area, particularly as aircraft flyways. As modern combat training tactics increasingly require the use of airspace outside of military bases, the preservation of aircraft flyway corridors for training is becoming increasingly important. While a range of land uses remain compatible with flyways (industry, utilities, and conservation lands), many uses are not (residences and commercial lands). Efforts to conserve corridors are therefore essential to the long-range functioning of military bases.

What Is Meant By Land Corridors

Land corridors are lands with linear, contiguous land uses. From a military perspective, corridors can provide training routes, special use airspace lanes, or connect one military base to another. Both conservation and infrastructure corridors can serve these military functions. Conservation corridors include contiguous land for protecting habitat and species (such as waterways, migratory flyways, or special conservation areas designed to link up areas of biodiversity), as well as outdoor recreational areas (including beaches, scenic trails, and human interest areas). Infrastructure corridors include linear land for utilities, energy distribution, railways, and roadways. Conservation corridors are likely to be the most beneficial to the military because they serve the dual function of protecting wildlife habitat outside the military base borders, thereby preventing the base from becoming an island of biodiversity, and because, unlike infrastructure corridors, they do not promote residential or commercial growth. As a consequence, the Land Corridors Working Group focused much of its attention on the protection of conservation corridors.

Conservation Corridors As A Sustainability Strategy: An Overview

The primary justification for protecting conservation corridors is presented in “Land Corridors in the Southeast: Connectivity to Protect Biodiversity and Ecosystem Services” by Thomas S. Hoctor, et al. (2007). The Working Group noted certain trends and findings of particular importance.

First, efforts to conserve biodiversity have moved away from small-scale efforts designed to protect particular species in specific habitats and towards larger regionally scaled efforts to not

only conserve these habitats but to connect them up through corridors that allows diverse habitats to remain functionally interactive with each other. Connectivity for wildlife has been increasingly seen as necessary to prevent development of biodiversity islands, where threatened and endangered species concentrate into a few viable habitats. This is significant from the military's perspective because military bases are often the hub of this biodiversity. Military bases often provide large tracts of viable wildlife habitat surrounded by landscapes fragmented by development. More regionally viable efforts to conserve larger landscapes would allow threatened and endangered species to populate areas outside of the military bases where they now concentrate.

Trends leading to landscape fragmentation are not abating and may in fact be accelerating. Population growth in the Southeast is causing natural landscapes to rapidly urbanize. While 18 million people currently reside in Florida, for example, 26 million are expected by 2030. Moreover, current local and regional plans allow for 55 to 90 million people to live in Florida. While 55% of Florida currently remains in a natural or semi-natural state, Florida loses one percent of this land each year to development. Open space in urban and suburban communities lacks sufficient ecological connectivity for wildlife and ecological networks to function adequately.

Second, efforts to conserve land corridors have moved beyond a focus purely on wildlife protection and toward a "multiple benefits" planning framework. The concept of "green infrastructure" is used to describe the linkages between conservation corridors and protection of lands that provide ecosystem services such as water supply and other related benefits to human communities.

Third, public policy tools have been insufficient to prevent significant fragmentation. Land acquisition is becoming more difficult due to sharply increasing land values. Growth management in Florida has proven unsuccessful at directing growth into more productive patterns, while growth management in other Southeastern states (particularly ones with strong home rule constitutions) is for the most part even weaker.

Fourth, efforts to more proactively conserve natural corridors are inherently interjurisdictional, and require the cooperation of multiple local and county jurisdictions, state government, nonprofit conservation groups, and military bases. A common planning framework is needed, one that is developed collaboratively and has the support of the various jurisdictions. Yet planning by itself often fails to be implemented because the plans have no "teeth." Incentives are needed if these plans are to be implemented. The incentives can come from many sources. In Texas, funding for corridor conservation is available, but difficult to obtain without an overall plan. In poorer communities that want growth but also want to preserve their land and culture, the maintenance of green infrastructure can lead to economic betterment.

Efforts to promote landscape-scaled conservation pose difficulties both political and scientific. Politically, such conservation requires the cooperation of many jurisdictions, only one of which is managed by the military. Scientifically, research at this scale is difficult to conduct, with issues of performing sufficient replication on a large scale to verify ecosystem viability.

Fifth, the military can contribute significantly not only to the sustainability of their own bases, but also to the ecological, social, and economic sustainability of the communities in which they reside by more fully engaging the process of conservation corridor planning and implementation. Many local communities, particularly the smaller ones that abut many of the military bases, need technical and planning assistance to engage issues of importance to both the community and the base. In communities such as Beaufort, SC, with three military bases, support for military functions is high but so is the impact of military activities. Airport noise overlays for the military and regional airport, for example, requires ordinances for the conservation of lands with significant noise contours, which in turn can be best designed through partnerships between the military bases and the surrounding communities.

Too often communities successfully fight against BRAC closures only to allow the partnership built to protect the base wane once the threat passes. But the sustainability of the base depends on the long term viability of the training grounds as well as the natural resource base upon which the installation depends. Examples of projects such as the Florida Greenway and the long term planning of the Galveston Bay shows that military engagement can help keep the community focused on conserving land corridors needed by both the base and the community. The Florida Greenway is a plan established by DoD, the State of Florida, The Nature Conservancy, and other partners for a 100-mile corridor of green space stretching from the Apalachicola National Forest to Eglin AFB. Continued engagement with partners on projects such as the Florida Greenway requires education of stakeholders and developers to make them aware of environmental benefits of buffer areas and corridors and the potential to dovetail security with conservation concerns.

The significance of these linkages will vary between various bases and communities. Efforts to prioritize the corridors and to plan for multiple uses – green and/or gray infrastructure and as military routes – are needed. Information for better decision making must be developed. And while communities adjacent to installations see the interdependency, communities farther removed are less likely to collaborate. Meaningful incentives for regional collaboration must therefore be expounded.

ISSUES

The Land Corridor Working Group identified five major issues associated with the identification and protection of land corridors. These include the mismatch between the spatial scale of the problems and the institutions available for communities and installations to resolve those problems, decision tools that marginalize the environment, lack of incentives to promote sustainability goals, stove pipe thinking, and the lack of capacity in both the military and the community to engage in meaningful collaboration.

Spatial and Institutional Mismatch

Of all the problems discussed by the Working Group, the lack of institutional and planning capacity to plan for sustainable development was considered the most important. Effective planning for corridor protection usually emerges only after valuable lands are lost, when a crisis focuses attention on the importance of what is being lost. Larger communities with resources to plan often have already lost potential corridors to fragmentation, while communities with unfragmented landscapes usually have little experience or capacity to engage in planning.

This problem with internal capacity is compounded by institutional and political constraints to corridor conservation. Corridors usually involve multiple jurisdictions, but the tools for protecting the corridors are local. Thus, while corridor planning requires regional cooperation, the planning and land use management tools are primarily imbedded in local governments. It is here that the balancing of property rights with societal needs is conducted. While the costs of corridor protection (loss of tax base, engagement in property rights disputes, potential short term loss of economic opportunity) are all local, many of the benefits associated with preserving a corridor (habitat protection, flood protection, species preservation, water quality maintenance) are enjoyed by the region as a whole, including the military installation. The sustainability of the community has implications for long-term viability of installations because installations often rely on the community for water and sewer services because they draw from the same resource base, yet the base rarely works to promote that off-base sustainability. Consequently, local communities with major military bases typically under-invest in corridor protection.

Even within government, conflicting goals among public agencies (e.g., development vs. conservation agencies) lead to conflicting programs. Authorizations, legislation, and appropriations can exaggerate these conflicts. As an example, the need to promote higher densities to make more land available for corridors is often countered by local ordinances that encourage sprawl. In addition, tax policies and markets are encouraging large land holders (e.g., timber companies) to subdivide land into smaller parcels for development, thereby promoting landscape fragmentation that further complicates the creation of conservation corridors.

Decision Tools that Marginalize the Environment

Effective decision making to promote corridor conservation faces a second major barrier, namely the lack of decision support tools that would enable corridor planners to effectively design and evaluate potential corridors, while valuing their cost and benefits. As environmental researchers and planners have seen, conservation corridors serve multiple purposes and therefore effective decision making for corridor planning must work across these multiple purposes. Decision makers face three major constraints: (1) the need for tools to help better estimate environmental values; the ability to conduct multi-attribute assessments; and the tools to enable military leaders to better determine its own long term needs for corridors outside the base.

First, current decision tools tend to underestimate environmental values, particularly when such values are long term. Part of this problem is generic, in that most decision tools use some variation of cost-benefit analysis, and such analysis systematically underestimates non-economic goods, such as are found in the environment. A different framework is needed for sustainability (quantifying value of environmental services) which places less emphasis on the pecuniary costs associated with project development and more on the non-pecuniary value of environmental services. In addition, because decision-making for conserving and managing corridors is complex and the scientific basis for assessing corridors is still being developed, additional research is needed on wildlife movement and the effectiveness of different types of conservation corridors at protecting habitat and species. Since they cannot wait until science provides clearer answers, management needs to be adaptive to both changing conditions found on the ground and new scientific knowledge about how to best manage conservation corridors. In addition, the corridors are ecologically useful in as much as they connect hubs of habitat. Many military

installations serve as ecological hubs; hence the management of the corridor needs to be linked to the management of the base.

Second, decision tools tend to be focused on the needs of specific stakeholders and must be better designed for multi-attribute analysis and to be shared between stakeholders. Given the complexity of corridors, criteria for selecting corridors (based on stakeholder interests) need to be linked to data about existing land uses and landscape values through methods that are transparent and acceptable to multiple stakeholders.

GIS databases are a significant tool for linking interests to options because they allow the resources to be visualized along the criteria of concern. GIS mapping allows the user to look at the whole landscape, identify criteria, map landscapes, and select the most appropriate lands. GIS databases are also increasingly interactive and allow users to test alternative scenarios. At the same time, GIS databases require consistent, current data, and criteria needs to be developed by the stakeholders who are partnering to design and implement the corridor. This requires efforts to update data, such as land cover data which is now seven years old, on a more regular basis. DoD may be able to be of significant help to communities in this regard. Stakeholder input can also be coordinated by the stakeholders themselves. However, these processes require significant resources, often provided by multiple stakeholders. Issues of resources, of who pays, need to be addressed.

Third, military leaders are currently ill-equipped to assess long-term needs for land management outside the boundaries of the military installation. The need to protect millions of acres for a variety of needs, matching military training (combat training area effectiveness) with sustainability (conservation), poses new challenges to base commanders. Is the military commander adequately equipped to make these choices? Current experience with Joint Land Use Studies to define buffer areas around military installations suggests that the task is difficult. The military needs to know how it might use lands in the future to fight wars that have not yet been fought with technology that has not been invented. Despite this uncertainty, the military is increasingly realizing that it cannot isolate either its training or its other functions from the communities that neighbor the installations. Hence, it is of significant importance that the military starts developing the tools needed for base commanders to effectively engage questions of the design and implementation of buffers (immediately outside the fence line) and corridors. Unless lands are conserved, rapid land development will significantly limit future options.

Lack of Incentives to Promote Sustainability Goals

A fundamental challenge to conserving corridors is the lack of incentives to promote such conservation. Most basically, the market for land provides a strong impetus for landscape fragmentation, since it is based on individual choice. The current approach to development, which promotes sprawl, is environmentally and economically unsustainable. Alternative development patterns that cluster growth and preserve green space are increasingly seen as desirable, but often are limited to the land area owned by a single developer. Larger, more regional conservation efforts must be cobbled together from within this land market.

Certainly education of community residents and leaders as to the benefits of sustainable development will help, but unless incentives are aligned to promote these goals, little progress

will be made. Focused acquisition for habitats and other protected areas is useful but limited because the very act of acquisition makes getting additional land more expensive, controversial, and difficult. Military commanders may be able to do little to promote better alignment of market mechanisms to support sustainability goals. They can, however, help create incentives systems to support inter-jurisdictional planning, to promote more careful consideration of both the military installation and the communities' future together.

Incentives for promoting long term sustainability are also lacking in the military. In the Florida Greenway area, the five military bases rarely speak to each other about conservation corridor issues. The issue is strategic, involving choices that will not directly affect the base for many years, and base commanders with short term concerns rarely focus on these issues.

Two additional observations should be made. First, many large land owners (e.g., timber companies) are facing new market incentives to subdivide and develop their properties. Such development would significantly impinge upon military installations. The military needs to identify these owners and work with local and state political leaders to conserve properties of particular concern to the military. This will mean making an incentives-based case to these owners, whether they be publicly held corporations, REITS, or pension funds. Secondly, the federal government is not particularly good at land acquisition and should rely on the expertise of large land trusts such as The Nature Conservancy, and on state and local governments to buy the buffers and easements.

Stovepipe Thinking

Conservation corridors require non-traditional partnerships that get leaders to apply sustainability across traditional jurisdictions within the military, between the military and other federal agencies (such as the Corps of Engineers as a potential partner in watershed and floodplain corridor conservation), and between the military and surrounding communities. Planning for such corridors often requires these stakeholders to think and act in a cross-disciplinary manner. Yet most stakeholders are accustomed to resolving specific problems using specialized tools. This specialization, and the fractured jurisdictions from which it springs, leads to "stovepipes" among federal agencies and other levels of government, which reinforces traditional ways of problem solving. Institutional and organizational supports will be needed if the military is to encourage its leaders to break out of this stovepipe thinking.

The Lack of Capacity In Both the Military and the Community to Engage in Meaningful Collaboration

Related to the concern for stove pipe thinking are barriers to effective engagement with other jurisdictions and interest groups in a collaborative setting. Problems exist both in the capacity of the stakeholders to set up a process of dialogue and in their ability to engage effectively in face-to-face dialogue. Of particular concern, existing collaborative partnerships often exclude local governments, developers, environmentalists, and other interest groups. Working Group members felt that neither the military nor local officials are investing enough in outreach to the other.

On the military side, considerable variety exists as to the capacity of base commanders and personnel to effectively assess and communicate strategic interests regarding encroachment on the installation and associated corridors. Currently, however, DoD's policies promote

engagement with communities around issues of localized buffers, but not conservation corridors. A DoD policy statement and commitment to the problems posed by land corridors is needed.

Many of the base personnel who manage community outreach have additional responsibilities and therefore do not regard outreach as their primary concern. The installations rarely create functional teams of personnel with skills in community outreach, GIS, natural resources, noise, and other areas of concern to the base and the community. In addition, there may be a stigma associated with working on sustainability planning coming from its association with endangered species law. Finally, the military's fiscal and administrative functions are separated from its planning system, thereby limiting resources for planning.

Likewise, local officials lack tools and regional planning capacities to cooperate on corridors. They also lack funding and are not provided with the direct authority for this sort of coordination. Effective mechanisms are lacking for transferring capacity from urban to rural areas (where the military may get the "biggest bang for the buck"). The situation is exasperated by a lack of civic capacity to manage complex problems including tax structures and inter-jurisdictional fragmentation. Councils of Government and Metrocouncils provide greater institutional support for region-wide initiatives, but few communities are incorporated into such councils. Who then will initiate efforts to create a "big table" to get all interests talking? Who will identify the multiple stakeholders with their differing needs, interests, and perspectives?

RECOMMENDATIONS

The Land Corridors Working Group considered alternative ideas for promoting more effective conservation of corridors of importance to the military. The Working Group was particularly interested in identifying opportunities with high payoffs and some reasonable chance of success. They took as their starting point that because corridors are linear, corridors are primarily inter-jurisdictional in scale, even when the corridor itself is relatively small. Corridor projects are also highly inter-connected, with military, social, economic, and environmental consequences linked. In addition, they saw conservation corridors as places without clear boundaries, that the mapping of these corridors requires criteria drawn from military and community interests in military preparedness, ecological integrity, and community health. Thus, most corridor projects will emerge not from the needs of the military alone, but from a process of research, assessment, and collaborative problem solving amongst the various stakeholders.

Primary Opportunity: Identify, Assess, Delineate, and Implement a "Corridor of Dreams" Pilot Project

The Group therefore recommended as a primary option that a military base, or possibly a set of military installations, identify a pilot project for corridor conservation, one where protection of the corridor(s) would promote the military and community sustainability. The project would identify military bases where conservation of military corridors (for training or connectivity between bases) would also afford significant opportunity to protect natural species, provide hazards mitigation, promote renewable energy resources, enhance water resources, recreation, public health, and enhance community economic opportunities. The assessment would be followed by a collaborative effort to develop a joint vision for this corridor involving the various

stakeholders and an effort to apply this vision to evaluate corridor criteria, delineate corridor boundaries, and develop investment and implementation strategies.

A pilot project to develop a “Corridor of Dreams” is considered the highest priority recommendation because currently the military lacks convincing examples of the value of conservation corridors and opportunities for promoting such corridors. Perhaps a pilot project related to the long-leaf pine ecosystem corridor between Fort Benning, Fort Rucker, and Eglin AFB would offer a good start. Creating more such examples, and by doing so testing the concept, is an important first step.

The following four sections explore options that could be used either in conjunction with a “Corridor of Dreams” pilot project, or as stand-alone efforts to improve the military’s capacity to identify, assess, delineate, and implement such corridors. The options fall into four major categories:

- Opportunities for greater coordination with local and regional partners, especially involving academic communities,
- Opportunities to improve policy and planning processes,
- Opportunities for enhanced research, including sharing and collaboration among researchers, and
- Tools to promote more effective information sharing.

Promote Local-Regional Cooperation

1. *Strategic Alliances to Promote Corridors.* Emphasis should be given to creating corridors that serve multiple purposes, thereby enhancing resources and commitment to implementation. This means that the military should seek to identify places where military training needs, particularly flyways, can be matched to grey infrastructure (utility and roadway) and green infrastructure (biodiversity and environmental quality) corridors. Efforts to promote collaborative community-military planning can also help protect against future BRAC closures, since corridor protection will increase the value of the base to the military.
2. *Capacity Building Within the Military.* Build institutional capacity for collaboration within the military by providing start-up funding and skill building training. Provide additional military personnel to staff community outreach efforts. The Marine Corps, for example, employs regional land use community liaison officers to coordinate community planning efforts. Create a “Center for Sustainable Planning” within the military. Coordinate among military bases and between the Armed Services about issues of regional importance by creating forums for inter-base coordination and outreach.
3. *Local, State, and Federal Capacity Building.* Engage local and regional communities in creating vision for corridors. Support the establishment of forums to promote a broader dialogue about opportunities for corridor conservation. Support GIS and visualization modeling that can be used by military installations

to work more effectively with local communities. Reach out to NGOs and corporations to promote mutual interests, and to local public officials to generate political and financial resources needed to plan for corridors. At the state and federal level, reach out to state environmental and natural resource agencies – US EPA, NPS, USFWS, USFS and other federal land management agencies – for opportunities to protect environmentally sensitive lands such as total maximum daily limits (TMDL) stressed watersheds.

4. *Linkages with the Academia.* Cooperation with local institutions of higher education can help build the capacity of both the military and local agencies to collaborate across jurisdictional lines. Build education and practice linkages with academia that promotes student education through internships and case-based work, using military bases as labs. This would promote cross training between environmental science and military missions. The ability of students emerging from such programs to deal with military-community environmental issues would be thereby increased, and the military would help train the next generation of military environmental planners.

Implement Policy Needed to Support Corridor Conservation

1. *Increase the Resource Base for Conservation Efforts.* While the military cannot directly lobby elected officials, other interested stakeholders can. Engagement with those stakeholders therefore has multiple benefits to the military. Regional partners can lobby elected officials for legislation and resources to promote and develop plans for corridors. Provide additional resources to military programs such as the Army Compatible Use Buffer (ACUB) program and the Renewable Energy Production Incentive (REPI) program. Examine other sources of legislative funding that can be linked to corridor protection, such as farm preservation sections of the Farm Bill and transportation enhancements associated with the transportation bill.
2. *Create Incentives for Landowners to Participate in Conservation.* Incentives to promote landowner willingness to either conserve land or sell to a buyer who will conserve the land are needed. Funding to generate resources for conservation can come from bond issues or through ecosystem utility taxes for environmental services. The skills of NGO land trust intermediaries such as The Nature Conservancy will often be necessary because of their capacity to work with the particular concerns of property owners. Such NGOs can also work to manage market timing by providing temporary protection when resources for permanent protection are not yet forthcoming.
3. *Create Incentives for Military Initiatives.* Base commanders and managers will address issues of sustainability only if such initiatives are encouraged and rewarded. This can take many forms, including incorporation into commander evaluations and the issuance of directives. In addition, current sustainability programs, which tend to focus on internal base management, can be expanded to

include external issues. Given the short tenure of most base commanders, special attention is needed to build long term relationships with external stakeholders.

4. *Identify Encroachment Threats.* Explicit military planning is needed to assess encroachment threats, identify buffer and corridor needs to manage these threats, and define criteria and standards for corridors. These in turn will provide the type of information needed by base commanders to allocate resources to corridor conservation efforts. Each military installation needs to have an encroachment plan to identify lands needed for buffers, easements or corridors. It might be helpful for an independent review or audit of the adequacy of these plans. Lessons should be drawn from the ACUB program and the Installation Natural Resource Management Plans (INRMPs).

Support Research that Increases the Capacity to Identify and Conserve Corridors

1. *Identify Corridors.* Engage the local/regional academic institutions in action research that is interactive, problem-focused, adaptive, and responsive will help military commanders deal with pressing problems, while also providing resources to academic institutions to convert theoretical research on conservation corridors into practical assessments. At the same time, support for basic science on the ecological characteristics and functioning of corridors is also needed. Together, advances in both basic and applied science will help identify, inventory, assess, evaluate, and specify optimal selection criteria for corridors of concern.
2. *Definitions of Buffer and Corridor Needs.* A better working understanding of what should be included within and excluded from buffers and corridors needs to be identified. While each installation is different, installations do not have the ability to research how to delineate buffers and corridors at the installation level. Research needs to be conducted to: identify densities and appropriate uses, keyed to mission; provide standards needed for a rational basis for decisions (including issue of light, height standards, noise and safety); provide a clearer sense of compatible land use criteria; and delineate the payoff associated with protecting such land uses to both the community and to the base.
3. *Best Practices for Building Community Collaboratives.* Conduct research into best practices for communicating the importance of corridors and other messages, including polling and focus groups will help military officers present a clearer case for the need for corridor conservation.
4. *Research on Military Efforts to Conserve Corridors and Buffers.* Develop innovative ways to promote academic research and participatory action research (engaging the community) through programs such as the Strategic Environmental Research and Development Program's (SERDP) focus on Statements of Need, the inventory of plans, the status of plans, identification of tasks to accomplish the assessment and evaluation, optimal selection criteria, methods for engaging with the community, and improved methods for adaptive management.

5. *Evaluate Ecosystem Services.* Promote research into a more sound accounting system to evaluate ecosystem services. One promising approach is through energy comparisons based on measures of emergy (solar emjoules), that assesses energy investment for energy return in both the ecosystem and the human system.
6. *Demonstration Projects.* Demonstration projects of two kinds are needed: first, to identify candidate communities or sites for corridor projects, such as a Benning-Rucker-Eglin corridor, and secondly, application of the Environmental Security Technology Certification Program or DoD-Legacy demonstration projects to identify best available techniques for corridor assessment, evaluation and communication.
7. *Cost-Benefit Analysis.* A fundamental problem with current assessment tools is the dominant role played by cost benefit analysis and its corresponding bias against values that cannot be quantified as economic benefits. This problem can be addressed in three ways. First, researchers can develop better ways to integrate ecosystem services into cost-benefit analysis by studies that identify the economic benefits of ecological services. Second, they can use cost-benefit techniques with more caution, focusing more on ecologically based assessment systems. Third, real market values can be created for environmental services which are then reflected in property values and income streams, such as by carbon sequestration programs.
8. *Cost Benefit Research on Use of Corridors for Military Uses.* Conduct an assessment as to the impact of military loss of airways, as well as efforts to relocate or add new airways (chartered Special Use Airways) for military use.
9. *Visualization.* Problems of visualizing the complex decisions needed to conserve corridors require improved tools for GIS-based multi-attribute assessment. Visualization tools are needed that also create, refine and simplify with a focus on promoting quality of decisions, by improving the capacity of decision makers to interact with GIS based systems, including options to explore alternative scenarios.

Promote More Effective Information Sharing

1. *Workshops.* Sponsor regional and community workshops to help promote communication through information exchange processes. Workshops can also serve as a forum for clarifying information needs by stakeholders and sources thereof for planning.
2. *Guidebook/Toolbox for Local Governments.* Given that many communities located near military bases lack the resources to engage in effective planning, the development of guidebooks and toolboxes targeted to sustainable development and conservation corridors can help raise both awareness and capacity of local governments to engage in a collaborative with military bases.

3. *Education.* Awareness of conservation corridors can be further enhanced by working with local schools to promote awareness and understanding of corridors. More generally, mapping often helps people visualize the importance of a resource. This can be particularly effective if community members are engaged in assessing the resource, such as when students gather data for the mapping.
4. *Educate the Public about Benefits of Corridors.* Examine and share the potential benefits associated with the protection of corridors. These include water quality, air quality protection, mitigation for climate change, protection of traditional communities, and reduction in costs for roads and other infrastructure. The American Farmland Trust has placed some of this data on its website. Members of the Working Group noted that while the long-term costs associated with development should be studied, communities have largely ignored previous studies examining these questions.

Literature Cited

Hector, T. et al. 2007, Land Corridors in the Southeast: Connectivity to Protect Biodiversity and Ecosystem Services. *In* Southeast Regional Planning & Sustainability Workshop Report. Department of Defense. (http://www.serdp-estcp.org/workshops/serps/docs/Land_Corridors_in_the_Southeast.pdf)

BUILT ENVIRONMENT

Phil Berke

EXECUTIVE SUMMARY

The Southeast is expected to experience unprecedented pressures for urban expansion over the next three decades. During the past half century, conventional low-density development (or sprawl) has increasingly dominated the landscape by converting vast expanses of open space into roads, parking lots, roofs, and driveways. This pattern of development cannot be sustained without a fundamental rethinking of how we Americans build cities and develop the landscape.

The Built Environment Breakout Group identified major issues that are barriers to countering conventional development practices, and offered policy and research recommendations to reform such practices. The aim is to move urban design and planning in a more sustainable direction, rather than simply reacting only after significant and often irreversible loss has occurred. The group recognized that a sustainable Southeast cannot be achieved without a coherent and supportive physical framework. On such a landscape, human settlements are located and built through a planned process so as to allow sustaining military training land, regional planning, and compatible land use.

Key issues include: (1) local plans and ordinances dominated by land use and urban design standards that support sprawl; (2) low capability of local jurisdictions to prepare plans and ordinances often results in “ecological train wrecks” wherein places with the most to lose (open spaces and natural resources) are least able to take proactive action; (3) spatial mismatch between local governance and regional landscapes; and (4) failures of land development markets to account for the worth of ecosystem services and public facilities.

Policy recommendations for reforming conventional development practices include: (1) strengthen intergovernmental partnerships through establishing a national sustainability coordinating council and conducting annual sustainability audits; (2) strengthen plan making and implementation by requiring or strongly encouraging state, regional, and local sustainability plans, and (3) build state, regional, and local capability to plan by making scientific information more accessible, establishing sustainability planning teams on military bases, improving public engagement programs, and creating university-based sustainability institutes.

Research recommendations include: (1) develop a new generation of fully enabled web-based regional land use planning and impact modeling systems that are readily accessible to state, local and military base staff; (2) create and apply a sustainability audit tool for local plans and ordinances; (3) develop a institutional performance assessment model (IPAM) to gauge the strength of regional partnerships, and how such partnerships perform in delivery of core regional planning goals; (4) develop tracking and early warning systems for military base managers to react to land use changes in buffers and corridors before, or as, they are occurring; (5) test social marketing strategies designed to communicate and build awareness about the environmental,

social and economic consequences of policy choices about future human settlement patterns; and (6) new science and technology needs for green buildings and neighborhoods.

INTRODUCTION

In the next thirty-four years, the U.S. will add 100 million people to the current population of 300 million, and metropolitan and coastal areas in the Southeast will absorb a disproportionately larger share of this growth compared to the rest of the nation (Godschalk, 2007). Where will these people live, work, shop, and recreate? What will be the impacts of growth on the military's ability to train, and the well-being of human and natural systems? What are the likely differences in impacts produced by alternative development policies and plans?

Timothy Beatley (2007), in his background paper for Build Environment Breakout Group, "Sustainable Cities in the Southeast," observes that the predominant paradigm of unfettered urban expansion cannot be sustained without a fundamental rethinking of how cities are built and the landscape developed. He notes that unfettered urban expansion results in disinvestment in central cities, separation by race and income, increased energy demands, deterioration of air and water quality, loss of agricultural lands and wilderness, and the erosion of society's built heritage are one interrelated community-building challenge, and that much of these adverse impacts result from unfettered urban expansion. The sobering fact is that these impacts are not unexpected. As urban growth accelerates across open landscapes, the potential for environmental, social, psychological, and economic impacts escalates accordingly. Beatley (2007) contends that at the same time, advances in green technologies, revised understanding of the relationships between urbanization and ecological disturbance, and new thinking about compact urban form have increased opportunities to integrate knowledge about sustainable communities into the design and development of the built environment.

Beatley (2007) emphasizes the importance of having a proactive urban design and planning program in place to move society in a more sustainable direction, rather than simply reacting only after significant and often irreversible loss has occurred. Such a program can be broadly construed to include not just a comprehensive plan, but also implementation practices that include regulations, incentives, and infrastructure investments used to guide the location, type, density and design of development. This approach prevents or minimizes adverse impacts in the first place, and supports green building technologies, open spaces and biodiversity, affordable and energy efficient housing, and multi-modal transportation systems.

While proactive planning and policy making is a potentially effective long-term solution, Beatley (2007) offers considerable evidence that existing local plans and programs, especially in the Southeast, are lagging and do not encourage more sustainable development. In addition, public apathy and a lack of political will may also hamper sustainability planning efforts. Beatley (2007) contends that sustainable development has created a new understanding of the need to plan future actions rather than simply respond to each crisis that may arise. Planning for sustainable development links concerns for environmental, social, and economic well being in a participatory process aimed at meeting present needs while preserving the ability of future generations to meet their needs.

In the context of the DoD initiative in regional planning, participants in the Built Environment Breakout Group recognized that a sustainable Southeast with economic vitality, community stability, and environmental health cannot be sustained without a coherent and supportive physical framework. On such a landscape, human settlements are located and built through a planned process so as to allow sustaining military training land, regional planning, and compatible land use. As reported in this chapter, participants identified major barriers to applying sound sustainable development principles, and recommended potential changes to planning and development practices, and research directions. The intent is to encourage the federal, state, regional, and local governments, and private and non-profit sectors to take action down a sustainable path.

ISSUES

The Built Environment Breakout Group identified four crucial issues associated with urban development patterns that dominate the U.S. landscape, and particularly in the Southeast: weak plans and ordinances; low capability to plan and ecological train wrecks; spatial mismatch in regional governance; and market failures.

Weak Local Plans and Ordinances

Successful examples of how individual communities integrate smart growth and green urbanism design standards into local plans and ordinances have been documented (Beatley, 2007) .

However, relatively few communities have plans and ordinances with specific, well-developed provisions that promote these sustainable urban forms. In the Southeast, the problem is particularly significant as local planning is dominated by policies and urban design standards that support conventional development patterns or sprawl.

Several dimensions of contemporary local plans and implementation practices under the conventional development paradigm were identified as particularly weak, including:

- Lack of integration of science-driven information that provides a fact base for protecting critical natural areas (wildlife habitats, wetlands, watersheds) and working landscapes (farms and forests).
- Short-term economic benefits of sprawl are prioritized over long-term costs associated with provision of public infrastructure and services (roads, sewer and water utilities, fire, police) resulting in delays in commuting, and increased rates of loss of natural areas and working landscapes in these same areas.
- Lack of attention to inter-jurisdictional coordination (among local governments, and between military bases and local governments) results in lack of protected landscape ecosystems and efficiently coordinated land uses with public infrastructure investments.
- Weak monitoring programs that lack specific, scientifically-sound metrics to gauge progress in plan implementation and performance in achieving public goals.

The consequences of weak plans and ordinances are foreboding. They point to limited knowledge about existing human and natural resource systems, urban development impacts on these systems, and regional-scale land use and community design solutions to counter prevailing conventional development trends. They also indicate the inability of local planning programs to address threats to military bases as buffers surrounding installations and corridors linked to them are under intense urban development pressure that generates incompatible land uses.

Low Capability and Train Wrecks

Communities that are well-endowed with open spaces and natural resources usually have low capability to prepare plans and ordinances to counter conventional development patterns. These places, often referred to as “exurbs,” are typically rural and located near the urban fringe, where conversion of open space to urban development does not usually encounter the same fierce development opposition as development proposals in built-up urban areas. Exurban communities have limited capability to anticipate and accommodate change, and often contain open spaces that are buffers adjacent to military bases and land corridors needed for military training (Carellas and Shanks, 2007).

A land use management paradox commonly takes place in these communities because they become active in planning only after they experience significant loss. The paradox arises when communities adopt strong planning programs after many critical natural resources they intend to protect have been lost to development. Former Secretary of the Interior Bruce Babbitt aptly called these events “train wrecks,” because they stimulate protection efforts that are reactions to an ongoing crisis – e.g., loss of seagrass in the Chesapeake Bay, water quality declines in the Everglades, loss of spotted owl habitat in the Northwest. The paradox also applies to disaster resiliency, and its converse, vulnerability. Communities adopt strong hazard mitigation plans, regulatory ordinances, and hazard land acquisition measures only after a disaster or intensive hazard area development has already taken place. In these instances, action is reactive to problems, rather than proactive to avert problems like loss of natural resources, and human life and property.

What emerges from the paradox is a low level of capability and willingness for proactive planning, and reactive practices that lead to temporarily increased capability which is much less effective in accomplishing planning goals. This pattern of behavior represents a significant threat to military bases that depend on compatible land uses in buffers and corridors. Without the warning signals of unsuitable land uses, habitat fragmentation, water quality decline, and increased disaster vulnerability, communities (and military installations) lack ample motivation to take action.

Spatial Mismatch Between Governance and Landscapes

A spatial mismatch exists between the scale at which local governments need to protect landscapes, create livable cities, and limit encroachment on buffers and corridors needed by military bases, and the scale at which land planning and policy-making is traditionally carried out. This mismatch is apparent in regions throughout the U.S., where a tradition of home rule and localism dominates amid landscapes that require thinking and planning on regional scales.

Several significant consequences of this mismatch were identified:

- Local governments direct too much effort toward identifying and protecting isolated patches of open landscapes often surrounded by urban development. This approach fails to take advantage of existing natural areas by connecting existing patches and corridors that may span across local jurisdictional boundaries.
- Fragmented land use regulatory authority keeps local governments weak. With regional landscapes chopped into dozens or even hundreds of governing entities, many local governments are too small and have inadequate tax bases to support the capacity to plan to deal with the widening challenges of urbanization.
- Fragmented governance stimulates sprawl-inducing competition among multiple jurisdictions for desirable commercial, industrial, and residential tax bases. The consequences are decreased shares of office space within existing central business districts, less centrality of development nodes in regions, longer commutes, and more sprawl.

Furthering fragmenting governance of land use are the regional authorities, special districts, and state and federal agencies that make separate decisions about land development and conservation within the same regions. The Atlanta Region Commission, for example, a moderate size metropolitan planning commission of 3.8 million people, includes 66 municipalities and 10 counties (www.atlantaregional.com), not to mention numerous other entities that influence land use, including federal programs that involve metropolitan transportation planning, habitat protection, and hazard mitigation; state land use and environmental regulations; multiple sewer and water authorities; and dozens of school districts. Many of these decisions also have bearing on development decisions inside military bases.

These divisions artificially divide regions that otherwise would represent single, interconnected ecological communities, as well as social and economic communities. They also complicate efforts to initiate cooperative planning, cross-boundary data collection, and coordinated decision-making.

Market Failures: Ecosystem Services and Public Facilities

In the conventional development paradigm of urbanization, market decisions about land use fail to account for the worth of ecosystem services (e.g., wetlands that mitigate floods and filter pollutants, forests that sequester greenhouse gases and offer recreation) and many types of public facilities (e.g., parks, roads, civic spaces, and libraries) that are valued by human communities. By ignoring these values, the marketplace does not price these services – allowing, say, destruction of wetlands that masks environmental costs and the lack of investment in public facilities. As a result, the conversion of land to urban development is done more cheaply by not accounting for the ultimate cost to communities and regions through higher taxes to treat water and the under-supply of public facilities.

The main concern is that land market decisions are based on the concept of “highest and best use” which is narrowly aimed at maximizing monetary profit for a specific development site.

Land values are dictated by market forces and four feasibility tests: (1) legally permissible uses allowed under zoning; (2) physically possible uses given the size, shape, and topographic characteristics of a site; (3) financially viable uses that generate adequate revenue to justify the costs of construction plus a profit; and (4) maximum profit uses among uses that are legal, fit the site characteristics, and financially viable. Under this conception of land value, ecosystem services are assumed to be free, invulnerable, and infinitely available, and public facilities are often not included in suburban developments.

Given this narrow conception of value, markets are unable to provide ecosystem services and public facilities in desired quantities. The long-term costs of not providing them may greatly exceed the short-term economic benefits of the development built to its “highest and best use.” These costs are generally hidden from conventional economic accounting, but are nonetheless real and are usually borne by society at large.

This suggests a need for policies that achieve a balance between sustaining ecosystem services and pursuing the worthy goals of economic development. The implications for military installation are significant. Forested lands, wetlands, and well-managed working landscapes that located in corridors and buffers surrounding bases usually provide higher levels of services when they are not impaired by urban development. Thus, appropriate market adjustments would serve the dual purpose of supporting ecosystem services and maintaining military capability to train. Policies are also needed to ensure adequate level of public facilities when base expansion occurs and demands for housing and services increase in the surrounding region.

RECOMMENDATIONS

Policy

The basic challenge for reforming conventional development practices that dominate urban form is to convert the crisis- (or train wreck-) driven system of development to a planning- and threat-driven system so that it becomes proactive rather than reactive. The aim is to ensure the long-term viability of military installations, developing coordination of regional partnerships with outside stakeholders, and creation of sustainable and compatible human settlements. The Built Environment Breakout Group recommended various possibilities for strengthening proactive sustainability planning in three main areas: strengthen intergovernmental partnerships that are proactive; strengthen planning requirements and incentives; and build capability to plan.

Strengthen Intergovernmental Partnerships

1. *Establish national sustainable community coordinating council.* At the federal level, DoD should not act alone but join with other federal agencies that have a common interest in creating sustainable communities and regions (e.g., EPA, DHS/FEMA, DOT, HUD). A national sustainable community coordinating council should be established among the agencies. Long-term viability of military installations should be but one element of a broader national policy on sustainable communities. A key role of this group would be to coordinate and integrate individual federal planning requirements into a comprehensive effort aimed at

preparing and implementing a sustainable community strategy. The goal is to build sustainability criteria not just into DoD planning initiatives but also into public infrastructure improvement, disaster resiliency, energy conservation, and all other guidance systems for managing built environments.

2. *Produce annual sustainability audits.* DoD should be responsible for assembling and publishing a regular “sustainability” audit for its bases and surrounding regions to educate Congress and the American people about the issues and trends of urbanization and viability of installations, the plans, programs and projects design to address them, and the economic, social, and environmental benefits of the plans, programs and projects. National sustainability policy is derived from trends and threats identified in the audit before they become train wrecks and communicated to DoD installations and states, which make plans and projects to counteract identified potential train wrecks. The sustainability audit should include:
 - Information on indicators, such as acres of protected corridors lands and buffers surrounding installations needed to ensure training, vehicle miles traveled, number of days that exceed air quality pollution limits, number of housing units that are affordable to low-income residents including military personnel and civilian staff, and so forth.
 - Audits for each military installation that are cumulatively compiled by region surrounding the installation, states, and the Southeast as a whole.
 - Projected impacts from scenarios of major trends and emerging issues for large metros and coastal regions under present conditions and growth estimates.

Strengthen Planning

1. *Require state and local sustainability planning and implementation.* The existing planning system in states varies across the Southeast. Ranging from states that adopt state planning policies and require local plans to be consistent with state policies to states that have no state planning policies and no local planning requirements (Godschalk, 2007).

States and local governments should prepare and update sustainability plans that anticipate and accommodate growth. State policies should also require or at least strongly encourage local governments through incentives to create sustainability plans. Key provisions to be included in local plans include:

- Knowledge base that draws upon sound science, and presents existing and emerging conditions related to urban development and conservation;

- Policies (e.g., regulatory, incentives, land acquisition) that correct market failures to protect ecosystem services and supply adequate public services, and are designed to advance sustainable urban development patterns;
- Provisions that account for local jurisdiction to coordinate with neighboring communities to address transboundary issues; and
- Implementation requirements that include assignment of responsibilities for implementation actions, monitoring and gauging plan performance, and regular updating of plans.

This planning effort should include full-time planning staff at state and local levels that are adequate to deal with the issues. Local sustainable community plans resulting from these planning processes are reviewed and approved by states. Each local plan should be reviewed annually according to their benchmark targets, and those that achieve the targets are certified as “sustainable managing” local governments. State programs could also be reviewed and those that have effective programs could also be certified. Certified state and local governments become eligible for higher funding levels and additional procedure flexibility.

2. *Institute regional-scale planning.* Establish regional-scale plans and policies to ensure sustainable regions as well as sustainable communities. Regional-scale issues that cover natural systems (river basins, coastal areas, and wildlife habitats), transportation systems, and housing affordability (to avoid pockets of poverty in some communities) should be addressed. This could take place through a variety of mechanisms like state-sponsored regional plans and planning agencies (as is used in Florida and Georgia), intergovernmental agreements in the form of interstate compacts (as is used in planning for the Chesapeake Bay and Lake Tahoe regions), and memorandums of agreement among local governments and substate regional planning agencies. Mandates or incentives (or a mix of both) could be used to foster local plan compliance with regional plans. DoD could assist the agencies involved in initiating regional planning processes as in the case of the Sustainable Sandhills regional planning effort near Fort Bragg, North Carolina, and regional corridor planning for Eglin AFB, Florida.

Build Capability

1. *Make information accessible to assist sustainability planning and policy-making.* Prominently missing from plans is a sound scientific fact base. The advent of mapped databases (GIS) provides new opportunities for improving the quality of information and predicting outcomes. New analytical tools allow planners and policy makers to assess the ecological, social, fiscal, public service and economic impacts of land use and development policy decisions. These databases and models are needed to guide urban development into suitable locations and away from high value conservation areas. Standard databases for sustainability planning should be shared and made available by clearing houses.

2. *Establish sustainability planning teams to build capability.* Military installations should establish sustainable community teams, whose mission is to build capacity to plan at regional and local levels. A key of this initiative would be to cultivate local leaders to become sustainability advocates through workshops and information exchange. These teams are made up of skilled and experienced spatial data (GIS) analysts, urban and conservation planners, and facilitators. To assist in this task DoD should establish sustainability planning institutes at universities in the Southeast – see recommendation #5 below.
3. *Create university-based sustainability institutes.* The institutes would bring together interdisciplinary groups of faculty, professionals, and students in the social sciences, natural sciences, urban planning, and environmental policy. DoD base operators, scientists and outreach staff would also be actively engaged. The institutes would conduct cutting-edge research on sustainable community design, and disseminate that knowledge through innovative teaching and outreach. Rather than serving as outside contractors, the staff of the institutes would offer an in-house capability to DoD to support active engagement – this would enhance the relevance of research, the responsiveness to particular needs, and that research is used effectively.
4. *Develop communication, public engagement, and leadership building strategies.* The importance of plans and policies that advance sustainable urban forms is apparent to most planners and conservation scientists. However, it has not been made clear to elected officials and the public. Tools are needed for planners to communicate the value of plans and urban developments that advance sustainability, and for scientists to communicate the knowledge that will enable planners, elected officials, and other local leaders in business and non-profit organizations (e.g., land conservancies, neighborhood associations) to carry out effective sustainable community design initiatives.
5. *Publish best practice manuals.* Publish manuals of best sustainable practices for built environments describing successes, identifying best urban design, communication, and engagement principles, and recommending practical techniques. The manuals should be aimed at state, regional, and local levels to help them reorient their practice to achieve sustainable communities.

Research Needs

The Built Environment Breakout Group recommended various possibilities for conducting research to strengthen societal capability to support sustainable human settlements through proactive planning and policy in five main areas.

1. *Regional Land Use Change and Impact Assessment Modeling.* Recent advances in Internet-based tools provide unprecedented opportunities for public participation, education, and scientifically informed planning and decision making. The first generation of web-based resources offered static documents or

information products. The next generation created mapping and visualization tools to view landscapes (e.g., Google Earth), and to specify user-defined features. Fully web-enabled analytical GIS packages, the third generation, are just now becoming available. These tools offer visualize analyses of land use alternatives, and make data, analyses and expertise accessible to all communities, especially those with limited capability to anticipate and plan for change.

The proposed research would take advantage of these emerging but relatively unexplored technologies to develop planning and impact assessment modeling. The model should have the capability to identify, visualize, and predict the impacts of alternative scenarios of future growth, and be easily accessible, graphically represented, and interactive. It could include various interrelated elements, including, for example:

- Base layer databases (e.g., natural resources, socio-economic characteristics, hazards, public infrastructure, current land use, zoning policy, traffic analysis zones) to serve as the foundation for land use and impact models on which users could query data, customize maps, and analyze “what if” scenarios of future growth;
- Multi-criteria analysis capabilities to identify the distribution of future growth (including development in buffers around bases and training corridors), hotspots of environmentally sensitive areas, polluted areas, and natural hazard areas; and
- Scenario creation capabilities that permit specification of alternative growth forecasts, land use change policies (local, regional, and state level), local tax situations, and sustainability initiatives, and comparison of the consequences of scenarios (e.g. loss of open spaces, vulnerability to natural hazards, energy consumption, greenhouse gas emissions, housing demands and supply, traffic congestion).

The model should be readily distributable via CDs and interactive Internet-based programs. Local people should be able to view maps of their areas, create their own maps to evaluate scenarios, and add their own data. Regional stakeholder forums can be created to engage stakeholders in the proactive assessment of their decisions, while using their input to further calibrate model scenarios.

2. *Self-assessment tool to audit plans and ordinances.* This instrument would be designed to serve as a local/regional government self-assessment tool to track how well local/regional government plans and ordinances (e.g., land use/building code regulations and incentives, infrastructure investments) counter conventional (or sprawl) development patterns and advance more sustainable patterns. The tool could aid local officials to identify potential gaps, and assess the strengths and weaknesses of how well plans and ordinances account for the sustainability criteria. The tool could be applied, for example, to gauge progress in county and municipal plans before compared to after the recent DoD sponsored regional

planning initiatives in the Sandhills of south-central North Carolina and Eglin AFB-Appalachicola National Forest corridor in the Florida panhandle.

The criteria will be based on a comprehensive literature review in the emerging field of sustainability sciences (e.g., see National Research Council publications, EPA Smart Growth reports). Although every plan brings together a series of choices designed to fit the unique needs of a particular community, the criteria should be robust in order to determine the strength of any local/regional plan and its implementation ordinances in supporting sustainable community design. The intent is to help planners and policy makers to systematically think about how facts, goals, and policies should be developed and integrated into a plan and implementation programs.

3. *Institutional performance assessment model.* Metropolitan regions in the Southeast are emerging as dominant economic units in a globalizing society. The multiple networks of institutions that govern metropolitan regions make decisions that exert significant impacts on regional institutional performance. While some important scientific and technical work is being done to mitigate the adverse societal impacts of urban development, much institutional change will be needed to tie this knowledge to advance sustainable human settlements. Yet, after decades of policy debate, little is known on how to create effective regional partnerships and how such partnerships perform in achieving core regional goals (e.g., more protected open spaces, reduced regional auto-dependency, revitalized inner city economies).

The proposed research will develop an Institutional Performance Assessment Model (IPAM) to assess the extent to which variants of regional partnership building strategies (data sharing, visioning, formulating plans/policies, setting priorities for action, funding) and organization reform strategies (consolidation of municipal and county governments, privatization of infrastructure facilities and services) have on the ability of metro governance institutions to deliver sustainable urban development and infrastructure services. The research will entail development of metrics to gauge the strength of institutional partnerships across metro regions and performance outcomes to be integrated into the performance assessment model. IPAM will help regional (and local) governing institutions to measure, compare, and improve institutional designs that most effectively build regional-scale partnerships that enable communities to take collective action for mutual benefit.

4. *Tracking and Early Warning Systems.* A high priority concern for military bases is the changing of land use patterns outside of the base boundaries and the potential impacts of those changes on training, landscape ecosystems, and community livability. Although historical changes in land use can be monitored through remote sensing, this approach does not provide an early warning for base managers to react to changes before or as they are occurring.

This project would develop an automated “early warning” system for planned or permitted changes in land use occurring in base buffers and corridors. The system will rely on the Internet and other sources to compile publicly available information about proposed changes in land use and provide that information to base staff in a format that is geographically-linked, user-friendly, and readily updatable. System capabilities will include continuous online mapping of proposed changes in land use plans and zoning regulations, and permits for proposed developments, and delivery of mapped and descriptive information (type, size, density, of proposed developments) to base operators. Base operators will be able to proactively act in ways they deem appropriate for a range of proposed changes in plans and zoning ordinances, and throughout development permit review processes.

5. *Social marketing research.* While the public rates many of the ills of sprawl like traffic congestion, air pollution, loss of open spaces, and rising costs of public infrastructure, they often reject many of the countermeasures used to control sprawl. Neighborhoods often oppose compact, mixed use urban forms compared to their perception of the more benign effects of conventional low density developments (or sprawl). Developing and carrying out communication and awareness building strategies about the consequences of personal and public policy choices about future human settlement patterns has become a critical need.

This project would involve supporting a social marketing research initiative focused on changing attitudes and behaviors in ways that mitigate the impact of urban growth on humans and the natural and built environments in which they live. It would draw on knowledge and techniques developed in the social marketing field. This field has evolved from a one-dimensional reliance on public service announcements to a more sophisticated approach which draws on theories of risk communication and survey research techniques. Rather than dictating the way that information is to be conveyed from the top-down, researchers would be actively involved in guiding public agency professionals on how to listen to target audiences, and building the program from there. This focus on the “consumer” would involve in-depth research and constant re-evaluation of every aspect of the research program.

6. *Science and technology needs for green buildings and neighborhoods.* In designing the built infrastructure, both on and off military installations, there are science and technology research needs for green or sustainable building and neighborhood design and advanced technologies that reduce the impacts on the environment. While significant research is being conducted in this area (Architecture 2030), taking this concept one step further highlights the need for technologies that enable the built environment to have a positive impact on the environment. Research is needed for new technologies that eliminate solid, liquid and gaseous wastes and that consume only recyclable or renewable resources, both during design and construction as well as operation and maintenance, and finally decommissioning of the buildings and infrastructure facilities, both for

military-unique built environments and surrounding communities. There is a need for carbon neutral and eventually carbon sequestering structures, structures that produce rather than consume oxygen, and that produce high quality water rather than sewage or polluted stormwater runoff.

In addition, there is a need for technologies that facilitate sustainable design of new and retrofitting of existing neighborhoods, both on and off military installations. The intent is to create neighborhoods that are less energy intensive, have lower environmental impacts, promote higher density development and that is as a system, more sustainable. These technologies should enable building new and retrofitting existing neighborhoods and infrastructure systems to meet Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND) or other green design certification requirements.

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MILITARY

Paul Friday

EXECUTIVE SUMMARY

Over the last 30-plus years, the military has gradually become more impacted by external forces that may cause encumbrances and restrictions on military training and operations. These forces are driven by many factors. First and foremost are the gradual and steady increases in populations around and near military bases and training areas. Concurrently, the military has evolved its doctrine and training thereby increasing its physical impact footprint (noise, safety concerns, etc.) by extending the distances of its tactics and weapon systems. Increased nighttime training also adds to the overall footprint. The result is a competition for air, land, water, and frequency resources that is much greater than ever before and will continue to increase and become more complex in the future.

The Military Working Group methodically reviewed the situation in the context of the military's past, present, and future. Many issues were discussed and the most pressing were further addressed to identify solutions and recommendations. The issues in this paper are only a representative sampling of the full scope of issues. The work group members felt it was important to lay a foundation for more detailed future efforts to fully scope all problems and issues and find comprehensive solution sets.

The Working Group issues are divided among three general categories. The first is a set of seven issues that is organizational in nature and is referred to as "Internal to DoD." The second set of six issues is related to "Policy" and the last set of five issues is associated with "Communications." The Working Group also identified a preliminary set of solutions and recommendations. The recommendations are categorized into three groups. The first is "Strategy, Policy, and Planning" – this group of recommendations primarily addresses many of the Internal DoD issues, such as the DoD needs to update and publish strategy and policy and guidance on encroachment issues, outreach, weapons acquisition and develop best management practices. The second set of recommendations is Communications – these recommendations correlate to the communications issues, such as clarifying the sharing of information, training of senior officers in encroachment issues, and understand the two-way impact of the economics of the installation and the community. The last set of recommendations is entitled research and though somewhat limited noted that more effort needs to be placed development of programs in addition to SERDP and ESTCP that address social and economic issues in combination with the environmental research being done..

INTRODUCTION

According to the background paper, *Challenges and Opportunities for the Military in the Southeast*, by George Carellas, former Chief of the DoD Southern Regional Environmental Center, the Southeast is in the midst of rapid change. “Population growth; Increasing urbanization; Traffic congestion; Growing inequalities; A struggling educational system; Water wars; Declining air quality; Ecosystem degradation; An economy in transition; Increasing global competition. These issues share several traits: they are spatial; they are not confined by political boundaries; they affect future generations; and they are related to each other.” The Southeast is experiencing unparalleled change with an anticipated 30–80% regional growth projected over the next 50 years. An example is the city of Atlanta, which has exploded in population from 1 million people in the late 1950’s to 5 million in 2007, currently the fastest growing city in the Nation. Within this regional projection is, according to Carellas and Shanks (2007), also the “greatest realignment and relocation of military forces in our nation’s history.”

Carellas and Shanks (2007) observes that the military has always been afforded a large presence and played a key role in the evolution of the Southeast, often referred to as being woven into the fabric of the Southeast; a role that will become even more prevalent in the future. A large number of military veterans are from “military-friendly” Southeastern states, which makes the growth of military assets in the Southeast, coupled with the significant investment of existing training ranges and infrastructure, even more understandable. DoD manages approximately 2.4 million acres of federal and state land in the Southeast, including national assets of exceptional ecological value and biological diversity. Of 400 major DoD installations world-wide, 79 are located in the Southeast. The Army is the largest stakeholder, managing approximately 58%, or 1.4 million acres, followed by the Air Force managing approximately 700,000 acres, the Marine Corps with approximately 180,000 acres and the Navy with 120,000 acres. Additionally, the U.S. Army Corps of Engineers is responsible for a significant amount of acreage, most of which is associated with navigation and flood control projects.

Carellas and Shanks (2007) emphasized that while military lands represent only 3% of the national federal land inventory, strong evidence shows an unexpectedly large proportion of biodiversity on those lands. The Military Departments collectively report over 220 federally listed species as confirmed residents or migrants through their lands, a good indicator of how well the military takes care of ecosystems and why military lands often become islands of biodiversity. A compelling example is Fort Bragg, which leads a model regional recovery effort that combines conservation efforts on private and public lands that in 2006 successfully resulted in a USFWS announcement that recovery goals were met for the Sandhills Recovery Population (1 of 9 Primary Recovery Populations) for the red-cockaded woodpecker.

All four Services are undergoing a transformation. Shifting from a threat-based force to a capabilities-based force to meet the challenges of the 21st century will help sustain the American competitive advantage in warfare. Transformation is a continuing process with no end point, meant to create or anticipate the future and to deal with the co-evolution of concepts, processes, organizations and technology. Change in any one of these areas necessitates change in all. Transformation is meant to create new competitive areas and new competencies and to identify,

leverage and even create new underlying principles for the way things are done; transformation is meant to identify and leverage new sources of power.

Carellas and Shanks (2007) highlighted the fact that new weapons systems and state-of-the-art technology are important parts of DoD's transformation. DoD is heavily engaged in addressing the accompanying issues and opportunities, while planning for the future. As associated functions and support-tails are further identified, military activities often have a more pronounced effect than initially anticipated. From a military-community perspective, combined growth aspects will cause serious strains on the regional/local ability to provide adequate housing, schools, hospitals, recreational areas, fire protection, road networks, sewage treatment, water distribution and general quality of life assets and maintain compatible land uses in the process. Such topics have been highlighted by local and regional planners and have spurred the military to strengthen its commitment to improve its interface with local planners and many others. DoD also must continue to improve its internal natural resources management in order to maximize the availability of training lands and yet be a good steward of its resources.

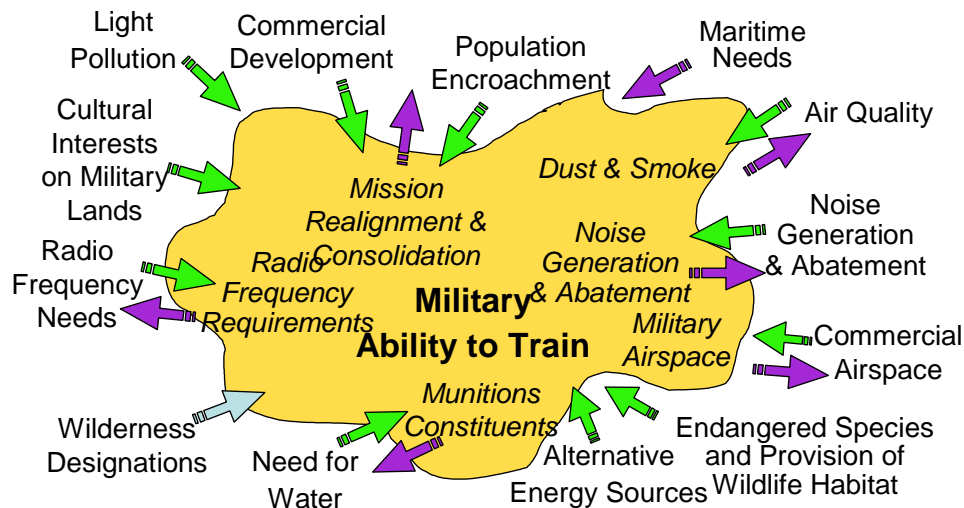
Through the years, many military installations have consistently gained national recognition as leaders in the stewardship of public lands, which is proving invaluable in building trust. The military has found ways to satisfy its military mission requirements, while maintaining a healthy environment and a strong community. The military now faces the challenge of building upon its own accomplishments and more fully integrating those stewardship values and practices within the Southeast Region and at all installations. Such challenges will provide significant opportunities to shape the future military in the Southeast, consequently, helping to shape the region during this time of unparalleled growth.

ISSUES

Overview

The Department of Defense is challenged by many issues relating to encroachment and sustainability associated with increased urban growth and the transformation of DoD's forces.

The 2004 Defense Installations Strategic Plan provides the following definition of encroachment: "Encroachment - Broadly defined, includes those outside factors that inhibit accomplishment of necessary live training and testing. Instances of encroachment such as compliance with escalating environmental legal statutes, competition for airspace and eroding DoD radio frequency spectrum along with substantial urban growth around previously isolated ranges." DoD also recognizes that the military encroaches upon the local communities. The following figure demonstrates the forces at work.



In 2000, DoD evaluated the potential impacts of encroachment on readiness and training. They stated that encroachment problems arise from a variety of sources and influences and that among DoD’s encroachment issues, the following were the most problematic:

• Incompatible Urban Growth	• Air and Land Space Restrictions	• Airborne Noise Impacts
• Cultural Resources Presence	• Air Quality Management Requirements	• Wetlands Restrictions
• Endangered Species and Critical Habitat Protection Requirements	• Unexploded Ordinance (UXO) and Munitions Presence	• Frequency Spectrum Interference
• Maritime Sustainability Needs	• Clean Water Act Requirements	

Encroachment is a long-term, growing concern to military readiness. “Urbanization,” the continued population growth and economic development around military installations and ranges, can create land/other resource demands or environmental restrictions that are incompatible with current and future military operations and training requirements. Likewise, new weapons systems and tactics can cause incompatibility with existing resource uses by creating more noise and requiring larger training areas than in the past. Encroachment problems arise from three primary sources:

- Conflicting incompatible uses both near and far from DoD installations that limit training, low-level flying routes and target areas.
- Federal, state, regional, and local regulations that restrict the use of land, airspace, water, and communications frequencies, including regulations designed to protect human health and safety, biological resources, and cultural resources.

- De facto designation of installations as “habitats of last resort” for threatened or endangered species and third-party pressure to use installation land for recreation, rights of way, potable water supplies, air- and water-quality mitigation programs and similar uses.

By far, the major unifying cause in the three aforementioned encroachment sources is population growth and urbanization.

Sprawl, commonly referred to as uncontrolled growth, affects everyone, not just DoD. Rapid and unconstrained outward urban growth is quickly consuming living space. The major catalysts for outward urbanization include: climate change, demographics, and politics. As sprawl increases, the public will have to make significant investments in national, regional, and local infrastructure such as primary and secondary roads, railroads, airports, energy transmission lines and pipelines, and utilities. Concurrently, our natural resources and environment will continue to be strained.

Predictions are that by 2030, the U.S. may need to rebuild most of the infrastructure it currently has (based on the data from 2000), including a 46% increase in need for new construction and an 88% increase in need for major replacement and reconstruction.

Encroachment – politically, economically, culturally, and environmentally – affects each Service equally, yet each Service, and in some cases subordinate commands within a Service, deals with encroachment issues and solutions differently. There is little consistency in identifying and prioritizing problems and solutions among the Services. Likewise, there is little consistency amongst outside communities and governments with regard to working with installations to find solutions. An installation is often not considered an integral part of the community or state given that its land, water, frequency and airspace aspects are viewed from the context of being inside a federal fence line. Incompatible resource uses are occurring frequently outside of these fence lines, requiring that the installations seek buffers between the installations and the communities to stem the progress of urban growth and its negative consequences on mission sustainment.

Since 9-11, the perception is that many DoD installations have become more isolated and therefore communications between them and the community is reduced. Reduced communications exacerbate poor resource use planning around installation and range boundaries thereby leading to more encroachment issues that may negatively impact mission sustainment. The ongoing war on terrorism further complicates dealing with encroachment issues because the leadership is focused on this endeavor at the expense of many domestic programs such as encroachment, environmental, and natural resource management.

Throughout the Military Breakout Session, the aforementioned background discussions were considered in identifying potential research issues that could be identified to prepare the research and development communities for potential requirements. Numerous issues were identified and discussed during the military session. They can be categorized as Internal to DoD, Policy Considerations, and Communications:

Internal to DoD

- Military leadership at multiple levels changes every two to three years. The change in command leadership at the intermediate and installation levels is a challenge for staff as well as state and community members. Each new commander takes approximately six months to understand the installation and state/communities' interests, needs, and issues. Each new commander also has a mission focus and desires to improve the installation's mission capabilities prior to his or her departure. Much knowledge is lost with each change of command. Program continuity can be interrupted, and in some cases completely eliminated, by the changes in command. Concurrently, state and community leadership also changes, although at a slower rate than the military rate.
- The military feels it is unduly carrying the bio-diversity responsibility. This issue is one of the most important throughout all of the Services, one which particularly the Army and Marine Corps. Ground forces need physical land space to train on. As the land space is constrained by regulatory restrictions, training and operations are more difficult to meet training standards. The solution includes obtaining interests in lands next to or near the installation to offset some of the internal restrictions imposed by regulatory agencies. The challenge is finding the right partners and the right willing land owners at the right time. Who is responsible for this combination of actions? Is the range staff, or the natural resource, or the real estate staffs responsible? Complicating the acquisition process is the question of how much land is necessary. If it is not enough to obtain regulatory relief, should it be purchased at all? Can purchases in combination with zoning suffice? If so, who is in charge? How much can DoD afford? Land prices are escalating while the funds available for acquisitions remain relatively small. Will there be enough funds to effectively use this practice in the future? Lastly, with growth comes other economic development opportunities; many communities near and around military installations see opportunities to improve their tax base. How can mutually beneficial, sustainable economic development be achieved?
- It is difficult to know what the future holds for a given region or installation. Military doctrine and weapon systems are constantly evolving as the external threat to America's national security changes. Commanders cannot say with certainty when they will need to change the way training is conducted nor when a new weapon system will be integrated into the inventory. This is a challenge for states and local communities who try to do land or other resource use planning on a time continuum of 10 years or more. Developing comprehensive plans and zoning ordinances are robust public processes that attempt to accommodate a regions growth needs over the next 20 years. Concurrently, the market forces are leading to development in the communities to accommodate current growth. If the military cannot project its needs in a timely manner, community planning cannot take it into consideration except without a lot of interruptions to its orderly planning processes. Usually, this is not an effective means and does not generally work well.

- There is a need to research the social culture as it relates to resolving encroachment issues. To solve problems, three conditions need to be present: (1) common interests, (2) relationships, preferably a good relationship, and (3) a process that promotes working together. DoD needs to better understand how to measure relationships and improve them with local, regional, state, and multi-state organizations as appropriate. Inherent in doing so requires that DoD better understand who the stakeholders are and how they perceive DoD. For better understanding stakeholders, attitudes need to be evaluated, especially in light of the specific issues that are challenges.
- How are corridors defined and used to support the military mission and other purposes? DoD trains in corridors, primarily by using them for low-level, high-performance aircraft training. These corridors also can be used to support natural systems and habitats. They are also parts of the greater landscape and can be protected to provide for the visual environment. In some cases, this land can be used for compatible land uses consistent with the noise environment and safety of flight issues. And, how might these corridors co-exist with evolving economic corridors?
- DoD does not grow range sustainment professionals. Although encroachment issues have been in existence for decades, the DoD has not recognized a professional job series to work these issues. Generally speaking, encroachment issues are managed by different staffs with different perspectives. The list includes but is not limited to Public Affairs, Environmental, Natural Resources, Range Management, Airfield Management, and Master Planning. The one exception is the Marine Corps which established Community Plans and Liaison offices to work encroachment issues. Compounding the issue of developing a professional series is the need for this person to be good at multiple skills such as communications, facilitation, mediation, negotiation, and understanding multiple business processes such as planning, legislative and regulatory affairs, military training and operations and more.
- Many of the tools and best practices used by DoD are similar and overlapping. On one hand, this is good because each tool should produce similar outcomes when employed. On the other hand, the incentive to create new tools and practices is not recognized. Accordingly, DoD over time becomes less effective in protecting its mission capabilities.

Policy Considerations

- How is future growth and associated economic development accommodated? This issue recognizes that growth will continue around military bases as well as within the overall military operating areas. Mechanisms need to be developed that accommodate the growth and associated economic development while simultaneously protecting the installation's mission capability. The mechanisms may range from existing programs, such as purchasing real estate interests in properties next to and near installation and range boundaries, to better

understanding the institutional drives of development (such as local governance and market forces that result in both compatible and incompatible land uses) to prototyping efforts to establish regional compatible resource models (which enable sustainable economic development).

- Encroachment is a multifaceted issue, although DoD tends to focus more on the land aspects of encroachment through its current initiatives. There is an important need to look at the regulatory aspects and their impacts as well. Environmental, airspace, and frequency problems can impact mission as much as urban sprawl. DoD has in the past tried to use changes in legislation to remedy some of the regulatory impacts with mixed success. More emphasis needs to be placed on these issues in the future as well.
- How should DoD implement encroachment planning? Encroachment equally impacts DoD and its Service components yet there is little guidance on how to cope with these problems. Each Service has, over the past few years, instituted initiatives to better deal with their encroachment issues. A quick review of those initiatives during the session reveals that there are some similarities but many differences. The session members felt that a more unified approach might be advantageous for the following reasons: (1) DoD could initiate a Planning, Programming, Budgeting, and Execution System (PPBES) program to promote the implementation of a formal DoD funding program, (2) individual Services could leverage each others experiences to evolve more effective mechanisms to deal with encroachment issues, and (3) communities in the vicinity of different Service installations would see uniformity in their approach to solving encroachment problems rather than dissimilarities that can be confusing to local government officials and land owners.
- States do not have organizations or activities that are designed to deal with military encroachment issues and similarly, DoD does not have the organizational structure to interact with state authorities uniformly on these issues. DoD did create Regional Environmental Coordinator (REC) offices to interface with the ten EPA regions and the state environmental regulatory agencies within the EPA region's area. This improved information exchanges and facilitates problem resolution at the installation and state level. This program is limited, however, because the REC focus is primarily on environmental regulatory issues. DoD needs to review the REC program in light of other organizational and program delivery activities and consider its future role, as appropriate, to address the aforementioned encroachment shortfalls. Conversely, the states need to recognize the value of its military installations and consider establishing offices that can aid the military in dealing with the myriad of regional and local resource use planning and regulatory issues that encroach on the military's ability to perform its mission. Failure to do so may result in an installation's closure in future BRAC efforts. The military is a major economic force in most states and this loss can be traumatic for the local communities where an installation has closed.

- Who will cover the cost of collaboration? It is recognized that part of the encroachment solutions will depend on DoD initiating collaboration, but who will be responsible for developing the policy, plans, and training? Collaboration is a long time process that cannot be started, stopped, and restarted again. Funding is a major consideration that is not being addressed at the lower echelons within DoD. With few exceptions, requests for funding at the local level cannot be justified based on a policy and or a higher headquarters' strategy or plans. In addition, many tools will be needed to support the collaborative efforts; how will they be identified and funded?
- How will critical habitat issues be addressed in the future? Will processes, procedures, and programs be developed that bring to bear all appropriate resource partners to collectively address this critical issue?

Communications

- There is a lack of understanding of the military mission. Most local, regional, and state organizations do not realize the breadth and scope of military training and operations that occur on its installations and ranges. Nor is there an appreciation for why the military conducts training as it does – it fights as it trains. Historically, local and regional communities have had access to the installations and some of its services but, in many cases, they have not observed how the military trains. In addition, the installations have been cooperative in working with local communities on the communities' needs for additional lands in terms of transferring and or exchanging it to satisfy a community need. Many installations cannot continue to do this due to potential losses in mission capabilities.
- Communication needs improving at all levels. This is true from many perspectives. Communications between DoD and installations and their counterpart organizations and communities are many times ineffective or lacking on key issues. Communications between staffs whether inside DoD or local, regional, and state organizations can be difficult since all of these organizations are functionally organized and managed thereby making internal lateral discussions and coordination difficult.
- There is a greater need to share information. This is a universal need if DoD is to improve its ability to protect its missions. Most encroachment issues are externally driven and therefore, most solutions lie with the external encroachment source. Data, information, and knowledge must be shared with all through multiple means to include information sharing, cooperating, coordinating, and in many cases, collaboration. Some of this must occur through established regulatory process such as issues related to the environment and local planning and much more can occur through establishment of informal and formal relationships. In all cases, it needs to be accurate and timely.
- How is it demonstrated that it is in the interest of all to support the military interests of the military's installations and ranges? First and foremost, DoD needs

to establish engagement and outreach activities that are based on policy and implemented through formal training programs. Secondly, DoD's messages need to be clear, honest, and timely. Third, DoD needs to find best practices that give communities and land owners incentives to work with DoD. Fourth, the subject matter needs to be relevant to both the military and the communities; otherwise, the issue may be interpreted as self-serving.

- Changing demographics around and near military installations will continue to present challenges. As communities grow and their economies diversify over time, the community's interests in the installation tend to wane and place less emphasis on the installation's value to the community. Given these changing circumstances, DoD must find ways to maintain and sustain the community's interest in the installation's mission. Again, it is important that DoD establish outreach and engagement initiatives at all levels – national, regional, state, and local. Inherent in this issue is the need to better understand the installation's economic value. This means that DoD needs to move from a passive player in the market place to one that influences and supports the market place to the betterment of the states, communities and itself.

RECOMMENDATIONS

Given the above issue discussions, a range of potential solutions were discussed.

Strategy, Policy, and Planning Needs

1. *DoD needs to publish strategy and policy* on the following topics:
 - Encroachment planning. This guidance needs to address program funding, program metrics, and information and planning requirements to include organizational responsibilities throughout the Services and DoD's chain of command.
 - Conducting outreach and engagement. This guidance needs to address what DoD expects all echelons to do concerning outreach and engagement and who is responsible for such requirements.
 - Encroachment planning in a joint service context. This guidance needs to address new joint bases policy on dealing with encroachment and for situations where local stakeholders need to work with multiple Services.
2. *Update existing policy and guidance* on the following topics:
 - Weapon system acquisition. An updated policy needs to better address the issue of how, when and where a system will be fielded in order to better communicate the impacts for local land and other resource use coordination actions.
 - REC operations to include identifying and establishing multi-state initiatives in collaboration with community plans and liaison functions

- Better articulate the role of Public Affairs, business/contracting offices, etc. in encroachment planning.
3. *DoD needs to publish supporting guidance and programs* for the following topics:
- Developing personnel skills and training requirements for professional staff working encroachment issues.
 - Documenting best practices and case studies that support the best practices.
 - Publishing “How To” documents as appropriate.
 - Establishing “Compatible Land/Resource Use Guidelines” to be used with states and local communities.
 - Develop guidance on how to better deal with regulatory encroachment. Earlier efforts focused on changing legislation with mixed results. Future efforts need to focus on improved management efforts such as preventing pollution and working with regulators concerning the interpretation and application of regulations.

Communications

1. DoD needs to clarify what information installations and ranges can share with the public as it relates to land use planning and future military operations.
2. DoD needs to encourage the inclusion of encroachment training in the DoD sponsored general officers training program for new O-7 officers as well as in the Services’ installation and range commanders courses.
3. DoD needs to publish case studies that identify the good and challenging aspects of conducting outreach and engagement activities. The case studies should address lessons learned to aid new commanders in taking over positions that involve significant levels of community involvement.
4. DoD needs to establish ad hoc training programs for conducting effective outreach and engagement activities as well as forums for engaging in real life encroachment problem solving until such time the training can be incorporated into Service schools and activities.
5. DoD needs to establish a DoD Outreach and Engagement Strategy and Plans to guide the Services overall community involvement actions.
6. DoD needs to continue to promote the Marine Corps Community Plans and Liaison functions for all Services and establish a DoD Public Affairs Plan to

ensure the messages are consistent among the Services and are delivered to all the needed audiences in a form the many audiences will understand.

7. DoD needs to better understand all of the interests and attitudes of potential stakeholders involved in encroachment issues.
8. DoD needs to better understand the economic and market forces that effect local land use development – this includes understanding incentives, land costs, property ownership issues, and market forces.
9. DoD needs to enhance its current multi-state initiatives in the Southeast and Southwest to explore opportunities to support “living laboratories” for testing and evaluating encroachment mitigation, outreach, and engagement activities. It is suggested that additional dedicated resources be applied to these efforts to supplement the Services programs and experiences. This can also be used as a forum for testing the establishment of state organizations that can better interface with the DoD.

Research

1. Natural resources and endangered species in particular are significant encroachment issues. The current SERDP/ESTCP research agenda is an adequate beginning but this research needs to be increased proportional to the amount of mission and training degradation that is occurring due to increasing numbers of acres being restricted from training. There is an increasing interest in looking at corridors for both training and providing habitat for plant and animal species as well as determining how to best integrate these with the concept of sustainable economic development. SERDP/ESTCP also needs to assess how it might best formulate activities addressing marine/coastal encroachment challenges.
2. Understanding the social and economic relationships between the military and multi-state, state, regional, and local communities is critical to resolving current and future encroachment issues. Current SERDP/ESTCP research programs do not address these issues. This kind of research is performed in other parts of DoD but has not, to the best of the participant’s knowledge, viewed its research in the context of encroachment. It is recommended that the additional DoD research organizations be included in future encroachment discussions.
3. Consideration needs to be given to the creation of multidisciplinary research teams (built communities, environment, agriculture, forestry, economics, social sciences, etc) to interface directly and participate actively within ongoing SERPPAS projects which are of sufficient scale to utilize system approaches, large enough to make a substantial difference, and which are designed to be adoptable elsewhere.

Literature Cited

Carellas, G., and R. Shanks. 2007. Challenges and Opportunities for the Military in the Southeast. *In* Southeast Regional Planning & Sustainability Workshop Report. Department of Defense. [http://www.serdp-estcp.org/workshops/serps/docs/EngagingAcademia_DoD_Southeast.pdf]

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CONCLUSION

DoD looks forward to working with the workshop participants and others to further review, and where possible advance, the recommendations contained in this Report. The recommendations cover a breadth of sustainability topics and reflect the hard work of the workshop steering committee, the workshop chair (Phil Berke), and the breakout group chairs. Whether about research, policy, or outreach; whether requiring short-term or long-term changes; whether Southeast-specific or national in scope, these proposals deserve – and will receive – close attention.

Since the workshop, DoD and its partners have already begun to implement some of these recommendations. One major recommendation resulting from the workshop was to engage formally the academic community with SERPPAS efforts through the existing Cooperative Ecosystem Studies Unit (CESU) network of federal and university partners. In furtherance of this recommendation, on October 25, 2007, SERPPAS signed a Memorandum of Partnership (MOP) with the Gulf Coast and Piedmont South Atlantic CESUs to collectively work in addressing land sustainability issues within the SERPPAS region. A SERPPAS-CESU Advisory Team is currently developing a strategic plan to (1) identify a mechanism for soliciting research proposals, (2) develop a research agenda relative to SERPPAS needs, and (3) identify funding sources to support research projects each year.

Similarly, since the SERPS workshop, SERDP and ESTCP have continued to fund a number of ongoing as well as FY2008 New Start projects that are addressing sustainability issues in the Southeast including the launch of the Defense Coastal / Estuarine Research Program (DCERP) at Marine Corps Base Camp Lejeune (see www.serdp.org and www.estcp.org for information on specific projects). In addition, SERDP issued a solicitation for research to be funded in FY2009 that includes topics of interest to those dealing with sustainability issues in the southeastern U.S. Specifically, a Statement of Need (SON) was issued for proposals to assess the impact of sea level rise on military infrastructure, an issue of concern for coastal installations in the Southeast. Three additional FY2009 SONs that were based on the results of a workshop on threatened, endangered, and at-risk species in the southeastern U.S., are requesting proposals in the following topic areas: 1) Development of Science-Based Recovery Objectives for Ecological Systems in the Southeastern United States; 2) Managing and Restoring Southeast Coastal Ecosystems Under the Threat of Climate Change; and 3) Accelerated Pine Forest Mortality in the Southeastern United States. Finally, SERDP is working to develop a framework for sustainability assessments that could potentially assist sustainability efforts for other military installations in the SE.

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APPENDICES

Workshop Agenda

Workshop Participants

Workshop Steering Committee

Workshop Read-Ahead Papers

Overview on Sustainable Ranges Initiative

Overview on SERPPAS

Overview on SERDP

Overview on ESTCP

SERPPAS-CESU Memorandum of Partnership

DoD Workshop on Southeast Regional Planning & Sustainability

AGENDA

Southeast Regional Planning &
Sustainability Workshop
April 25-27, 2007
Atlanta

Wednesday, April 25, 2007

7:45 – 8:30	Registration/Continental Breakfast
8:30	General Session: Welcome and Introduction to the Workshop
	<ul style="list-style-type: none"> • Facilitator: Lewis Michaelson • Workshop Purpose/Overall Agenda - Bradley Smith, DoD Strategic Environmental Research and Development Program (SERDP) • Bruce Beard, DoD Sustainable Ranges Initiative (SRI) • Overview of SRI - Bruce Beard • Overview of SERDP/ESTCP - Bradley Smith • Background on 2006 DoD Academic Session - Jonathan Weiss, SRS Technologies and George Washington University • Current Workshop Overarching Goals and Potential Outcomes - Philip Berke, University of North Carolina
9:45	Major Sustainability and Regional Growth Trends in the Southeast
	<ul style="list-style-type: none"> a) Growth and planning trends b) Military realignment, community/regional planning initiatives, and SERPPAS
10:50	Break
11:05	Breakout Groups, Process, and Five Core Areas: Overview and introduction of key breakout themes. Introduction of and brief remarks by breakout chairs:
	<ul style="list-style-type: none"> • Built Space - Philip Berke • Military - Paul Friday, Marine Corps • Agriculture - Robert Brown, North Carolina State University • Forest - Neal Wilkins, Texas A & M University • Land Corridors - Michael Elliott, Georgia Institute of Technology
	Questions and Discussion
12:00	Lunch - Not Provided By Workshop - (hotel restaurant available)
1:15	First Set of Breakout Groups on Issues Identification
3:00	Break
3:15	Continue Breakout Groups
5:00	Adjourn
5:10	Reception – light hors d'oeuvres (and cash bar)
	Dinner on your own

Thursday, April 26, 2007	
8:15	Continental Breakfast
9:00	General Session: Report out by Chairs on Breakout Groups and Questions Report outs by Chairs Discussion on major identified issues and cross-cutting topics
10:40	Break
11:00	Panel on Innovative Southeast Collaborative Initiatives Moderator: Chris Russo, State of North Carolina <ul style="list-style-type: none"> Florida Greenway and Eglin Air Force Base Jesse Borthwick, Eglin AFB Sustainable Sandhills and Fort Bragg Jon Parsons, Sustainable Sandhills
12:30	Working Lunch
1:30	Overview of Second Set of Breakout Groups
1:45	Second Set of Breakout Groups on Solutions and Collaborative Approaches
3:00	Break
3:15	Continue Breakout Groups
4:30	General Session: Status Report and evening activity options
5:00	Adjourn
Evening	Dinner on your own (suggested activities provided)
Friday, April 27, 2007	
7:45	Continental Breakfast
8:30	General Session: Report out by Breakout Chairs and Themes/Progress Group Discussion Emerging Themes and Potential Opportunities
10:15	Break
10:30	Continue Group Discussion on Emerging Themes and Potential Opportunities
11:30	Wrap up (summary and Next Steps) - Berke, Smith, and Beard
12:00	Adjourn

Workshop Participants

Jeff Allen	Clemson University
Spencer Banzhaf	Georgia State University
Bob Barnes	The Nature Conservancy
Bryan Barnhouse	ICMA
Doug Bachtel	University of Georgia
Bruce Beard	Department of Defense
Tim Beatley	University of Virginia
Lionel “Bo” Beaulieu	Southern Rural Development Center
Gary Belew	Army Environmental Command
Phil Berke	University of North Carolina
Jesse Borthwick	46th Test Wing - Eglin AFB
John Brent	Fort Benning
David Brentzel	AFCEE
Robert Brown	North Carolina State University
Stuart Cannon	US Army Forces Command
George Carellas	Dep. Asst. Secty. of the Army (ESOH)
Lawrence Carlile	Fort Stewart
Ben Changkakoti	Pima County AZ
Charles Clarkson	The Clarkson Group
Gerry Cohn	American Farmland Trust
Virginia Dale	Oak Ridge National Laboratory
Camille Destafney	Navy Region Southeast
Kelly Dickson	NOAA Coastal Services Center
Cliff Duke	Ecological Society of America
Mark Dunning	Marstel-Day Consultants
Michael Elliott	Georgia Institute of Technology
Kirk Emerson	USIECR
Samuel Figuli	HydroGeoLogic, Inc.
Paul Friday	U.S. Marine Corps
Dean Gjerstad	Auburn University
David Godschalk	University of North Carolina-Chapel Hill B61
William Goran	Army Corps of Eng. ERDC-CERL
Thomas Gunther	U.S. Geological Survey
David Guynn	Clemson University
John Hall	SERDP/ESTCP
Thomas Heffernan	46 th Test Wing - Eglin AFB
Tom Hocter	GeoPlan Center - University of Florida
Robert Holst	HydroGeoLogic, Inc.
Alice Howard	Marine Corps Air Station, Beaufort
James Huber	Marstel-Day Consultants

Workshop Participants (continued)

David Hughes	Clemson University
Rick Jones	Columbus Consolidated Government
Deborah Keller	The Nature Conservancy
Stephanie Kline	Mantech SRS Technologies, Inc.
Michael La Duc	SAIC
Roel Lopez	Texas A&M University
Rose-Ann Lynch	Marstel-Day Consultants
Mike Mastrangelo	Center for Sustainable Development
Wayne Masur	Forest Capital Partners, LLC.
Tad McCall	Army Environmental Policy Institute
Tara McGrath	Coastal Conservation League
Susan McIntyre	North Carolina State University
Manette Messenger	U.S. Army IMA Southeast Regional Office
Lewis Michaelson	Katz & Associates
Christine Olsenius	Southeast Watershed Forum
Jon Parsons	Sustainable Sandhills
John Richardson	U.S. EPA Region 4
Linda Rimer	U.S. EPA
Michael Rosenzweig	University of Arizona
John Rupnik	HydroGeoLogic, Inc.
Chris Russo	North Carolina Dept. of Environment & Natural Resources
Alicia Shepherd	HydroGeoLogic, Inc.
Rick Sinclair	U.S. Army IMCOM Southeast
Brad Smith	SERDP/ESTCP
Mark Smith	United States Military Academy West Point
Jim Sweeney	University of Georgia
Phil Trader	Economic Development Administration
Jim Van Ness	DoD Office of General Counsel
Geoff Wang	Economic Development Administration
David Wear	U.S. Forest Service
Jonathan Weiss	ManTech SRS Technologies, Inc.
Allison Welde	SFI, Inc.
Summer Wilkes	Marstel-Day Consultants
Neal Wilkins	Texas A&M University

Steering Committee Members

Robert Becker	Clemson University
John Bergstrom	University of Georgia
Philip Berke	University of North Carolina at Chapel Hill
Michael Elliott	Georgia Institute of Technology
Gerrit Knaap	University of Maryland
Michael Rosenzweig	University of Arizona
R. Neal Wilkins	Texas A&M University
Marybeth Brenner	New Jersey Department of Environmental Protection and Environmental Commission of States
Charles Clarkson	The Clarkson Group
Paul Friday	USMC Installations East
Manette Messenger	US Army Installation Management Agency Southeast
John Wiens	The Nature Conservancy
Larry Wiseman	American Forest Foundation
Bruce Beard	DoD – Sustainable Ranges Initiative
Brad Smith	DoD -- SERDP/ESTCP

Workshop Read-Ahead Papers

([Adobe](#) Acrobat Reader required)

These background papers were prepared by experts in advance of the workshop for distribution to workshop attendees. They are available on-line on the workshop website at <http://www.serdpestcp.org/workshops/serps>.

Southeast Agriculture: Trends and Issues

Gerry Cohn, Southeast States Director, American Farmland Trust

Land Corridors in the Southeast: Connectivity to Protect Biodiversity and Ecosystem Services

Thomas S. Hoctor (University of Florida-GeoPlan Center), Will L. Allen, III, Margaret H. Carr, Paul D. Zwick, Ellen Huntley, Daniel J. Smith, David S. Maehr, Ramesh Buch, and Richard Hilsenbeck

Trends in Southeastern Forests

David N. Wear, USDA Forest Service

Sustainable Cities in the Southeast U.S.: Trends and Future Directions in Green Urbanism

Timothy Beatley, University of Virginia

Trends in Our Military Land Use Patterns

George Carellas, US Army Southern Regional Environmental Coordinator

So What is This Thing Called Sustainability

Manette Messenger, US Army IMCOM Southeast

Southeast Growth and Planning: Trends and Issues

David R. Godschalk FAICP, Department of City and Regional Planning University of North Carolina at Chapel Hill

Tools for Managing Urban Encroachment on Military Bases

Gerrit-Jan Knaap and Jason Eversole, National Center for Smart Growth, University of Maryland, and Jeff Allen, The Strom Thurmond Institute, Clemson University

Southeast Regional Sustainability Partnerships

Alison Dalsimer, HGL

Southeastern Regional Conservation Research Projects

Robert Holst, HGL

Sustainable Ranges Initiative

The Department of Defense (DoD) Sustainable Ranges Initiative (SRI) works to ensure the long-term viability and continuity of military installations, including training and testing ranges, while providing good stewardship of the land. Key to the Initiative has been working with outside stakeholders to develop a framework of compatible land use efforts, coordinated regional planning, and community partnerships.

The SRI has assumed major importance to DoD in the face of the growing challenge posed by unchecked urban sprawl and other encroachment pressures on military training and readiness. Effects of urban sprawl include:

- Impairment of night vision training due to light from nearby development
- Loss of habitat for endangered species, often making military lands the “last refuge” for imperiled species fleeing development
- Restrictions on flying hours and routes due to increased noise complaints from new neighbors

An invaluable component of DoD’s sustainable ranges effort is supporting land protection and sound planning through efforts such as the Readiness and Environmental Protection Initiative (REPI). The DoD REPI Program provides funding to the military services to assist their installations in working with state and local governments or non-governmental organizations to acquire conservation easements from willing sellers. The REPI program, launched in 2004, has already led to more than two dozen conservation buffer projects across the country, securing more than 60,000 acres of valuable buffer lands.

More information on the Initiative is available at www.denix.osd.mil/denix/Public/Library/Sustain/Ranges/sustainable_ranges.html

SERPPAS

As part of DoD’s Sustainable Ranges Initiative, the Department has increasingly emphasized partnerships between military services and across state boundaries. The Southeast represents a challenging opportunity for sustainability planning, given the tremendous economic and population growth taking place in the region. Moreover, base realignment will lead to increased personnel and activities at a number of Southeast bases.

In view of these challenges and the need to think across boundaries, DoD has entered into the Southeast Regional Partnership for Planning and Sustainability (SERPPAS). This pilot effort, which involves several Southeast states (North Carolina, South Carolina, Georgia, Florida, and Alabama) and other stakeholders, promotes a working regional partnership designed to mutually benefit the military and the natural and working landscapes in the region. SERPPAS is developing focused collaborative projects to address shared regional issues.

SERDP

The Strategic Environmental Research and Development Program (SERDP) is the Department of Defense's (DoD) environmental science and technology program, planned and executed in full partnership with the Department of Energy and the Environmental Protection Agency, with participation by numerous other federal and non-federal organizations. To address the highest priority issues confronting the Army, Navy, Air Force, and Marines, SERDP focuses on cross-service requirements and pursues high-risk/high-payoff solutions to the Department's most intractable environmental problems. The development and application of innovative environmental technologies support the long-term sustainability of DoD's training and testing ranges as well as significantly reduce current and future environmental liabilities.

ESTCP

The **Environmental Security Technology Certification Program** (ESTCP) is a Department of Defense (DoD) program that promotes innovative, cost-effective environmental technologies through demonstration and validation at DoD sites.

The Environmental Security Technology Certification Program's goal is to demonstrate and validate promising, innovative technologies that target the most urgent environmental needs of the Department of Defense (DoD). These technologies provide a return on investment through cost savings and improved efficiency. The current cost of environmental remediation and regulatory compliance in the Department is significant. Innovative technology offers the opportunity to reduce costs and environmental risks. ESTCP offers funding in the following four focus areas: Environmental Restoration, Munitions Management, Sustainable Infrastructure, and Weapons Systems and Platforms.

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